Understanding Earnings Inequality in Appalachia: Skill Upgrading versus Rising Returns to Skill

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I. Executive Summary

The Appalachian region is one of the most persistently poor areas of the United States. A focal explanation for the weak economic performance over the years is the fact that Appalachia has long lagged behind other regions in terms of the supply of skilled workers, particularly those with higher levels of education attainment, and this lack of skill has perpetuated poverty in the region. In recent decades, however, residents of Appalachia have begun to narrow the gap in education attainment. To what extent this relative skill upgrading in Appalachia has translated into higher wages and reduced wage inequality across regions of the country depends on changes in the relative returns to skill. Knowledge of how regional differences in skill levels and returns to skill translate into regional differentials in economic inequality and development is crucial to a better understanding of widening inequality in general, as well as for more targeted policy prescriptions for regional economic development. For example, if the returns to education are the same in Appalachia as in the rest of the country, but education attainment is lower in Appalachia, then reducing the wage differential across regions requires further increases in educational attainment. In contrast, if both the level of and return to education are lower, then policy should focus on increasing the return to education (via the labor demand) as well as the supply of an educated workforce.

In this report we use data from the 1980–2000 Integrated Public Use Microdata Samples (IPUMS) of the Decennial Census to decompose changes in the wage levels and distributions of men and women within and outside Appalachia over the past two decades. We estimate standard human-capital wage equations for workers that allow for region-specific differences in the returns to skill at both the means of the region-specific wage distributions as well as at numerous percentile points across each distribution. Although our focal emphasis is on wage differences between residents of Appalachia and those outside Appalachia, we also examine changes in the returns to skill in urban and rural areas, for both the country as a whole as well as within the Appalachia region; differences in the returns to skill within and between Appalachia for states in the Federal Reserve's Fourth District and within and between Appalachia by state, for states within the Fourth District that have non-Appalachian regions: Kentucky, Ohio and Pennsylvania.

With the wage equation estimates we conduct a variety of counterfactual wage decompositions to assess whether the changes in wages within and between Appalachia and other regions are due to changes in the levels of skill attainment or changes in the returns to skills. The wage decompositions are based both on standard methods used in the discrimination literature for examining differences in conditional means (Oaxaca 1973), as well as more recent methods proposed by Machado and Mata (2005) to decompose changes in wage distributions.

We find evidence that the returns to schooling rose dramatically for men and women in the 1980s for both regions, but then declined in the 1990s within Appa-

lachia relative to the rest of the nation. We also find evidence of a dramatic drop in the returns to experience among men in Appalachia during the 1980s, but an increase in experience returns among Appalachian women. With the estimated coefficients we decompose changes in the Appalachian-non-Appalachian wage differential into changes due to skill levels and changes due to returns to skill. We find substantial evidence of skill upgrading among men and women in Appalachia over the past two decades such that the majority of the regional wage gap in 1980 was due to skill level differences whereas by 2000 it was accounted for by differential returns to skill.

While much of the difference in mean wages is confirmed by the distribution decomposition, we find that the returns gap is more important in explaining the preponderance of low-wage male workers in Appalachia while the skills gap is important for explaining the lack of high wage workers in Appalachia. For women, difference in skill levels and returns appear to be equally important across the distribution. The gap in skill returns among low-wage men in Appalachia is largely driven by changes in the returns to experience over the past two decades, which could be explained in part by regional changes in labor force participation.

Our analysis of regional decompositions based on urban-rural designations reaches the opposite conclusion from our analysis of Appalachian/Non-Appalachian wage gaps; namely, that the urban-rural wage gap became increasingly influenced by skill differentials between urban and rural communities. Although the time pattern of skill returns between urban and rural areas is akin to that which we identified with Appalachian/Non-Appalachia, gaps in skills between urban and rural areas rose faster and accounts for the different results. Because Appalachia contains both urban and rural communities, skill upgrading in the urban areas has propped up the region as a whole.

At the same time, however, for men we find that skill shortages remain more pronounced at the high end of the wage distribution (and in rural America in general), which is borne out in the fact that college completion and advanced degrees in Appalachia are about one-half the rate of attainment in the rest of the country. To bring Appalachia more in parity with the rest of the nation more of her residents need to complete post-baccalaureate degree programs—a supply-side issue—but because skill returns differ policy must also focus on the demand-side issue of developing high skill jobs that encourage higher-educated Appalachians to remain in the region rather that migrate to higher returns in other areas of the United States.

II. Introduction

Few regions within the United States engender as much attention as Appalachia when discussing the economics of poverty and inequality. The region is one of the most persistently poor areas of the country, and is where President Johnson traveled in 1964 to declare the nation's 'War on Poverty.'[1] In the aftermath of Hurricanes Katrina and Rita in 2005, re-

1. President Johnson announced the War on Poverty on April 24, 1964, in the small town of Inez in Martin County, Ky.

newed media and political attention to the economic challenges facing Appalachia have emerged as part of the dialogue on poverty and inequality in America. A common focus of concern over the years is the fact that Appalachia has long lagged behind other regions in terms of the supply of skilled workers, particularly those with higher levels of education attainment, and this lack of skill has perpetuated poverty in the region (Black and Sanders 2004; Ziliak 2007). In 1980 only 57 percent of the residents in Appalachia had completed high school or more, compared to 67 percent nationally. The comparable percentage in Appalachian Kentucky was 40 percent. However, the ensuing two decades witnessed a heightened degree of skill upgrading in Appalachia relative to the nation overall. By 2000 the fraction of Appalachians with at least a high school diploma rose to 77 percent, while nationally the high school completion rate rose more slowly to 80 percent. The gains were quite dramatic in Eastern Kentucky where high school completion rates rose to 62 percent by 2000.

To what extent this relative skill upgrading in Appalachia has translated into higher wages and reduced wage inequality across regions of the country depends on changes in the relative returns to skill. Indeed, understanding the role of skill levels, and the market returns to those skills, has been at the core of much research on wage inequality. This vast literature has linked the growth in inequality to expanding college-high school premiums, rising returns to unobserved skills, and the skill composition of the workforce, among others (Bound and Johnson 1992; Katz and Murphy 1992; Juhn, Murphy, and Pierce 1993; DiNardo, Fortin, and Lemieux 1996; Lee 1999; Autor, Kearney, and Katz 2005; Lemieux 2006). The inequality research to date, however, has been comparatively silent on wage differentials of workers within and between geographic regions, especially those regions known to suffer from skill deficits such as the Appalachian region of the United States. Knowledge of how regional differences in skill levels and returns to skill translate into regional differentials in economic inequality and development is crucial to a better understanding of widening inequality in general, as well as for more targeted policy prescriptions for regional economic development.

Mounting evidence suggests that while still lagging behind the United States as a whole, the Appalachian region has shown some social and economic convergence toward the United States during the last decade. The convergence appears to be primarily in the direction of decreased income inequality (Black and Sanders, 2004) and high school graduation rates (Haaga, 2004b). Income growth in Appalachia has generally kept pace with the United States, but average income levels are still below those of the United States (Black and Sanders, 2004). Unemployment rates are perhaps the brightest news: male unemployment in Appalachia fell from 8% in 1990 to 6.4% in 2000 (Black and Sanders, 2004), nearly twice the change for the United States as a whole. Population growth in the Appalachian Region is slower than in the country as a whole and the population is aging faster than the country as a whole as well (Pollard, 2003).

An important indicator of the changing economic climate and an overall measure of economic well being is the earnings of wage and salary workers. Even within Appalachia, the majority of households are supported by wage and salary workers. It is surprising that there exist few, if any, studies of the determinants of earnings for Appalachia as compared to the rest of the United States or the rural United States (our search revealed none). It is also crucial to understand why measures of earnings inequality (percentile ratios) are lower for Appalachia than for the rest of the country and growing at a slower rate because understanding the determinants of earnings and earnings inequality is important to understanding the causes and potential solutions to poverty in Appalachia. As an example, consider the impacts of education. Appalachia has lower educational attainment than the rest of the country and it is well know that increasing education will increase earnings. However, it is not known if the return to education is higher or lower in Appalachia. If the return to education is the same in Appalachia as in the rest of the country, then policy should focus on educational attainment. In contrast, if the return to education is lower, then research and policy should focus on increasing the return to education as well as increasing the level of education attainment.

Similarly age and hence potential labor market experience is well known to positively impact earnings, albeit at a decreasing rate for older workers. However, in spite of the aging of the Appalachian region (Haaga, 2004a), earnings continue to lag behind the rest of the country. One explanation is that the return to labor experience in Appalachia is lower than in the remainder of the country. Only by estimating models of earnings and experience can we measure this difference and understand how the age distribution in Appalachia changes.

Finally, Black and Sanders (2004) show that earnings inequality in Appalachia is lower and rose more slowly than the rest of the United States. This may be due to slower wage growth at the higher ends of the earnings distribution, or it may be due to faster wage growth at the lower ends of the earnings distribution. Only by specifically examining the determinants of earnings at these ends of the distribution can we clearly understand the implications of the observed changes in earnings inequality.

In this report we use data from the 1980–2000 Integrated Public Use Microdata Samples (IPUMS) of the Decennial Census to decompose changes in the wage levels and distributions of men and women within and outside Appalachia over the past two decades, including the area encompassing the Fourth District of the Federal Reserve System. We first estimate standard Mincer log-linear human-capital wage equations for workers that allow for region-specific heterogeneity in the returns to skill at both the conditional mean and various conditional quantiles of the region-specific wage distributions. With the parameter estimates we conduct a variety of counterfactual wage decompositions to assess whether the changes in wages within and between Appalachia and other regions are due to changes in the levels of skill attainment or changes in the returns to skills. The wage decompo-

sitions are based both on standard methods used in the discrimination literature for examining differences in conditional means (Oaxaca 1973), as well as more recent methods proposed by Machado and Mata (2005) to decompose changes in wage distributions. After conducting our analyses for the broad regions of Appalachia versus non-Appalachia, we examine whether the differences are largely driven by differences in skill levels and returns between urban and rural areas because Appalachia is a heavily rural region of the nation.

By comparing the returns to education and experience, and the distribution of predicted values from these models over time within and between regions we will gain a deeper understanding of the determinants of wage inequality in Appalachia and the reasons for the changes during the 1980s and 1990s.

III. Data

The data derive from the Integrated Public Use Micro Samples (IPUMS) of the 1980, 1990 and 2000 Decennial Census. The IPUMS contain typical variables used in estimation of wage equations such as education, age, gender, race, occupation and industry, and also include some geographic identifiers (called county groups in 1980 and Public Use Micro Areas in 1990, and 2000). We begin our data in 1980 because earlier IPUMS data contain no geographic identifier below the state level, so it is impossible to estimate individual-level earnings equations separately for the Appalachian region without access to confidential data. We select prime age workers between the ages of 25 and 60 who do not have missing or allocated wages. The age cutoffs are chosen to minimize the presence of full time students and those nearing retirement, while dropping those with allocated earnings is warranted in order to avoid attenuation bias in skill returns as shown in Bollinger and Hirsch (2006). These basic filters result in nearly 7 million men and 6 million women across the three Censuses.

The key advantage of the IPUMS data are the long time series of cross sections and the exceptionally large sample sizes that permit identification of region-by-gender skill returns across the wage distribution. The main limitation to these data is that the geographic identifiers are not perfectly co-incident with the Appalachian Region. In 2000, for example, PUMA 1000 in Kentucky (which contains Floyd, Johnson, Magoffin, Martin, and Pike counties) contains only counties which are also designated in the Appalachian region. However, PUMA 0600 (containing Kentucky counties Adair, Casey, Clinton, Cumberland, Green, McCreary, Pulaski, Russell, Taylor and Wayne) has one county (Taylor) which is not designated as part of Appalachia. Similarly, PUMA 0500 (containing Allen, Barren, Edmonson, Hart, Metcalfe and Monroe) contains only three Appalachian counties (Edmonson, Hart, and Monroe). Hence, for many individuals we can assign their status as Appalachian residents (or not) simply from the PUMA information. But for PUMAs that include both Appalachian and non-Appalachian counties, we cannot.

In order to overcome this limitation, we use information from the Decennial Census Summary Files, which contain popula-

tion counts for all counties. From the Summary Files we determine the proportion of residents in a particular PUMA who live in Appalachia. These proportions are then used to weight individual observations in the summary statistics and regression models to follow. Since the Summary Files contain detailed population counts by age, sex, and race, the weights can be constructed to reflect the probability that the particular individual actually lives in Appalachia. This procedure has its roots in weighting for stratified samples and weighting for item non-response. Summaries of these well documented procedures can be found in Groves et al. (2004).

The Appalachian region encompasses 410 counties across portions of 13 states ranging from New York to Mississippi and all of the state of West Virginia. Much of the region is rural, but it does include several large urban centers such as Pittsburg, Pa., Knoxville, Tenn., and Birmingham, Ala. Figure 1 (page 9) depicts the distribution of our sample that live in Appalachia by PUMA designation. The figure makes clear that most of the Appalachian PUMAs are wholly contained within Appalachia, but that there are several border PUMAs especially in the states of Virginia and Alabama. Figure 2 (page 9) displays the PUMA-level poverty rates in 2000 for the same sample of men and women and it is clear that the states encompassing Appalachia are some of the most poor in the nation. The overall poverty rate in the U.S. in 2000 was 12.4 percent compared to 13.7 percent in the Appalachian region. Perhaps more telling of the long-term struggle against poverty in Appalachia is Figure 3 (page 10), which is from the Economic Research Service of the USDA and depicts counties that are deemed by the ERS to be 'persistently poor'; that is, they have poverty rates in excess of 20 percent in each of the last four Decennial Censuses. Parts of Appalachian Alabama, Kentucky, Mississippi, Tennessee, and West Virginia fall into the ranks of persistent poverty.

The focal dependent variable of interest is the real hourly wage rate. We construct the real wage as the ratio of annual earnings to the product of weeks worked and hours of work per week, and then deflate the average hourly wage by the personal consumption expenditure deflator with 2000 as the base year. We follow the standard literature by taking the natural log of the real hourly wage. The other variables of interest are the education, experience, race, and marital status of the workers.

Table 1 (page 11) contains summary statistics for our sample of working men and women in each of the last three Decennial Censuses broken down by residency in Appalachia. Among men inside Appalachia versus those outside, we see that the log wage gap widened from 0.1 log points in 1980 to 0.13 log points in 1990 and then narrowed slightly to 0.12 in 2000. The widening in the 1980s occurred because male wages in Appalachia fell more than those in the rest of the nation, while in the 1990s the wages of men within Appalachia grew more than the wages outside the region. Among women, the wage gap widened from 0.12 log points to 0.17 between 1980 and 1990, but unlike men, women in both regions experienced wage growth in the 1980s but wages of

Figure 1: Percent of Census 2000 Puma Population Age 25-60 in Appalachia

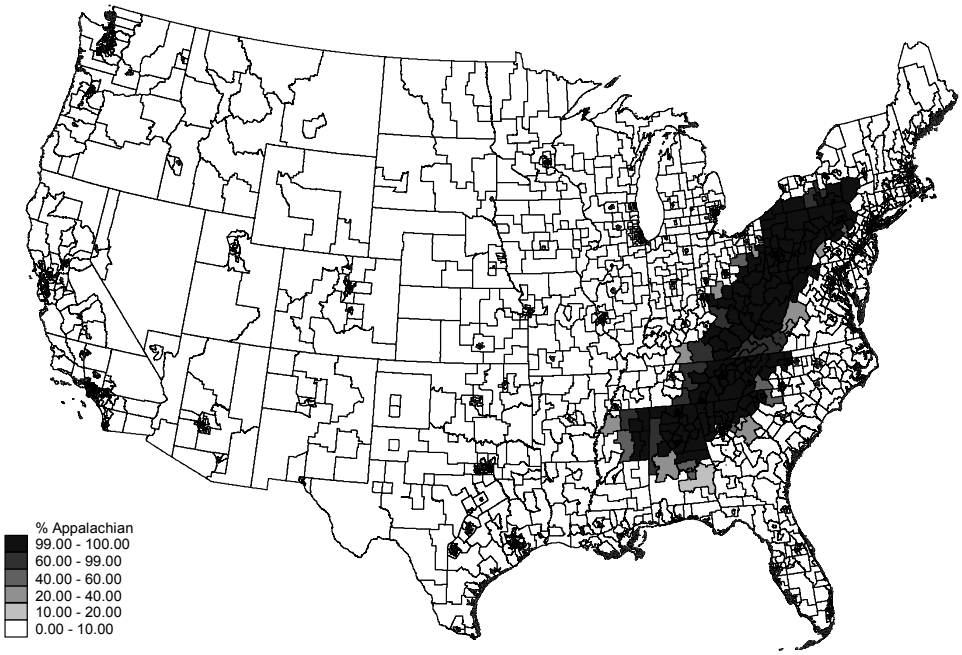


Figure 2: Percent of Census 2000 Puma Population Age 25-60 that are Poor

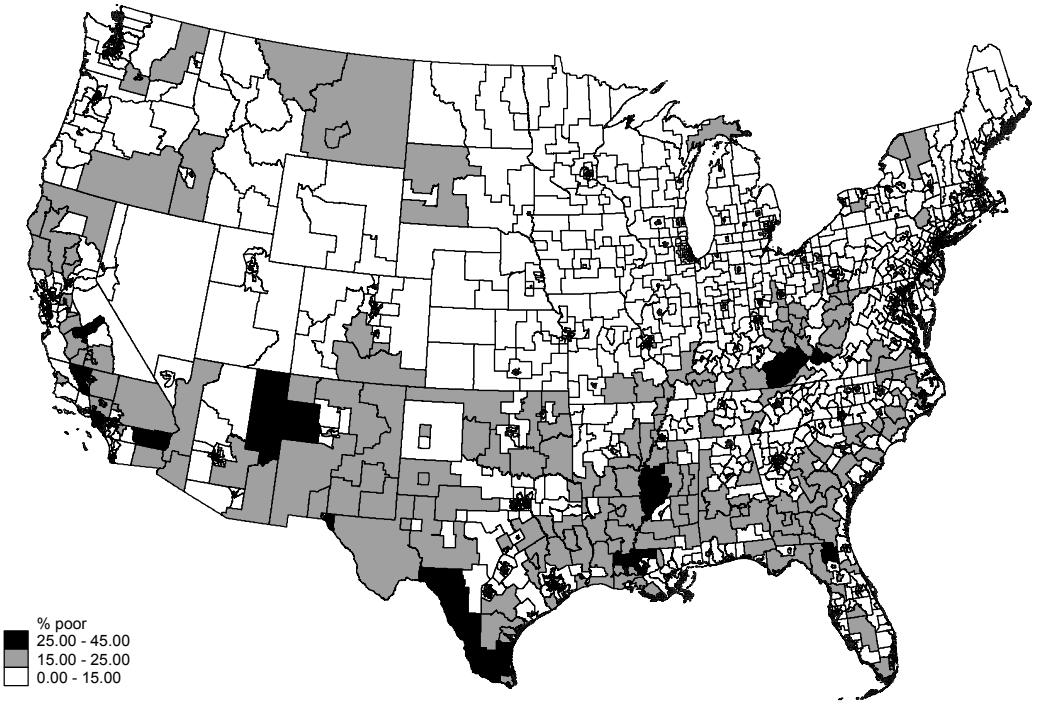
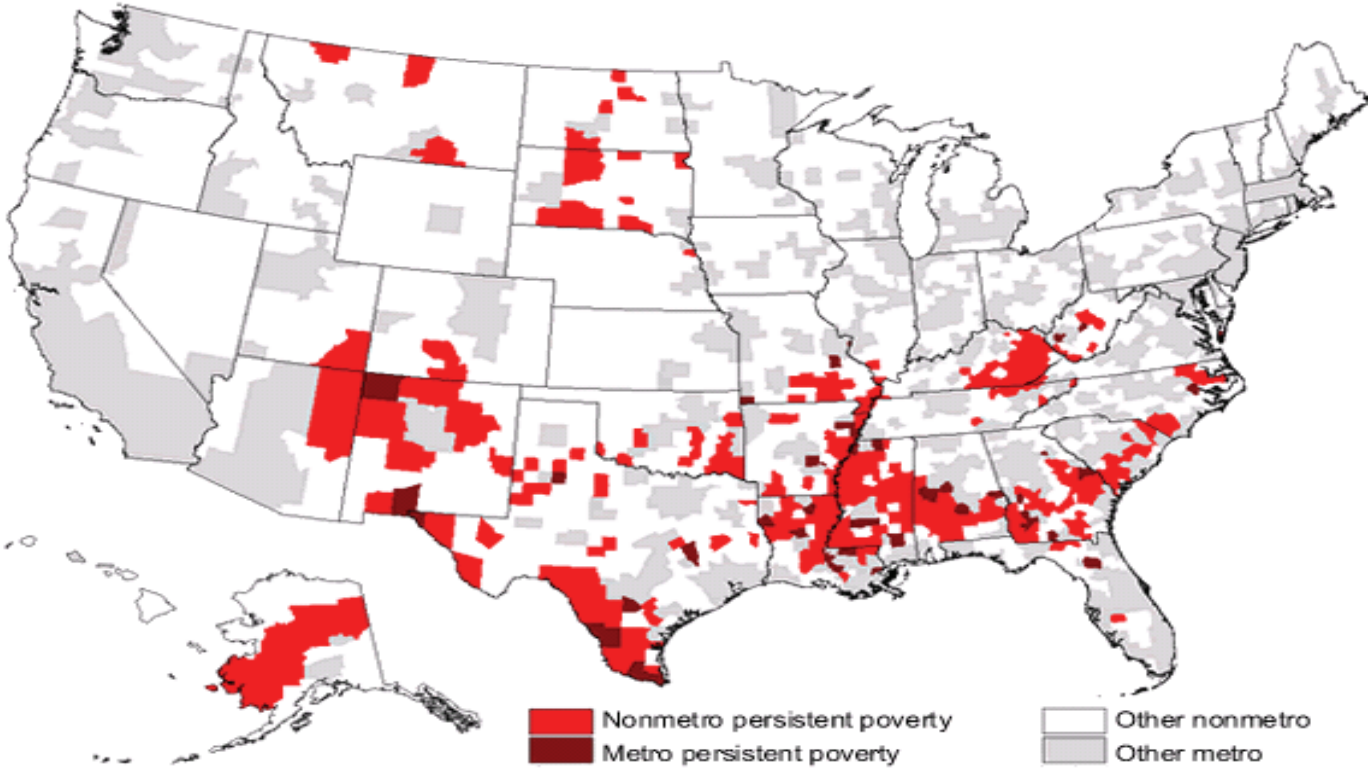


Figure 3

Persistent Poverty Counties, 1970-2000



Persistent poverty counties--20 percent or more residents were poor as measured by each of the last four censuses, 1970, 1980, 1990, and 2000.

Source: Economic Research Service, USDA.

Table 1: Summary Statistics of Men and Women within and outside Appalachia, 1980-2000

	1980				1990				2000			
	Appalachia		Non-Appalchia		Appalachia		Non-Appalchia		Appalachia		Non-Appalchia	
	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
Men												
Log of Real Hourly Wage	2.67	0.72	2.77	0.74	2.61	0.69	2.74	0.72	2.68	0.66	2.80	0.74
Less than high school	0.29	0.45	0.21	0.41	0.17	0.38	0.13	0.34	0.12	0.32	0.11	0.31
High School	0.39	0.49	0.34	0.47	0.42	0.49	0.32	0.47	0.42	0.49	0.31	0.46
Some College	0.14	0.35	0.20	0.40	0.23	0.42	0.28	0.45	0.26	0.44	0.29	0.46
Bachelors Degree	0.12	0.32	0.16	0.37	0.12	0.32	0.17	0.37	0.13	0.34	0.18	0.39
Masters or more	0.06	0.23	0.09	0.29	0.07	0.25	0.10	0.30	0.07	0.26	0.10	0.31
White, non-Hispanic	0.94	0.24	0.83	0.38	0.94	0.24	0.79	0.40	0.90	0.29	0.72	0.45
White, Hispanic	0.00	0.06	0.06	0.23	0.01	0.07	0.08	0.28	0.01	0.10	0.06	0.23
Black, non-Hispanic	0.05	0.22	0.09	0.28	0.05	0.22	0.08	0.28	0.06	0.24	0.09	0.29
Black, Hispanic	0.00	0.02	0.00	0.03	0.00	0.01	0.00	0.04	0.00	0.02	0.00	0.04
Other, non-Hispanic	0.00	0.07	0.03	0.16	0.01	0.09	0.04	0.19	0.02	0.13	0.06	0.24
Other, Hispanic	0.00	0.02	0.00	0.06	0.00	0.01	0.00	0.04	0.01	0.10	0.06	0.24
Potential Experience	21.77	11.58	20.65	11.47	21.31	10.34	20.19	10.23	22.33	9.90	21.59	9.86
Live in a MSA	0.42	0.49	0.74	0.44	0.37	0.48	0.70	0.46	0.45	0.50	0.75	0.43
Currently Married	0.84	0.37	0.78	0.41	0.77	0.42	0.71	0.45	0.72	0.45	0.68	0.47
Women												
Log of Real Hourly Wage	2.19	0.68	2.31	0.70	2.22	0.65	2.39	0.68	2.39	0.64	2.55	0.69
Less than high school	0.25	0.43	0.18	0.39	0.13	0.34	0.10	0.30	0.08	0.27	0.08	0.27
High School	0.47	0.50	0.42	0.49	0.44	0.50	0.35	0.48	0.39	0.49	0.29	0.46
Some College	0.14	0.35	0.20	0.40	0.26	0.44	0.32	0.46	0.31	0.46	0.34	0.47
Bachelors Degree	0.11	0.31	0.14	0.35	0.11	0.31	0.16	0.37	0.14	0.35	0.19	0.39
Masters or more	0.03	0.18	0.05	0.22	0.06	0.25	0.08	0.27	0.08	0.27	0.10	0.30
White, non-Hispanic	0.92	0.27	0.81	0.40	0.92	0.27	0.78	0.41	0.90	0.30	0.72	0.45
White, Hispanic	0.00	0.06	0.05	0.22	0.00	0.07	0.07	0.25	0.01	0.08	0.05	0.21
Black, non-Hispanic	0.07	0.26	0.11	0.32	0.06	0.25	0.11	0.31	0.07	0.26	0.12	0.32
Black, Hispanic	0.00	0.02	0.00	0.04	0.00	0.01	0.00	0.04	0.00	0.02	0.00	0.04
Other, non-Hispanic	0.00	0.07	0.03	0.16	0.01	0.08	0.04	0.19	0.02	0.13	0.06	0.24
Other, Hispanic	0.00	0.02	0.00	0.06	0.00	0.01	0.00	0.04	0.00	0.07	0.05	0.22
Potential Experience	21.58	11.37	20.56	11.30	20.87	10.24	20.15	10.20	22.05	9.93	21.57	9.97
Live in a MSA	0.43	0.49	0.75	0.44	0.38	0.49	0.70	0.46	0.45	0.50	0.75	0.44
Currently Married	0.72	0.45	0.68	0.47	0.71	0.46	0.65	0.48	0.67	0.47	0.62	0.48

those outside Appalachia grew faster. Again, in the 1990s the wages of women grew across the nation leaving the relative wage gap constant at 0.17 in 2000.

There are several other trends of note in Table 1. First, there is strong evidence of relative education upgrading in Appalachia between 1980 and 2000. The percentage of high school dropouts in Appalachia fell by nearly 60 and 70 percent for men and women, respectively. Men are now significantly more likely to matriculate from high school and to complete some college, while women showed large gains in some college and advanced degrees. The growth of some college is coincident with the expansions of community colleges in the region. This convergence in education attainment should narrow the gap in wages, assuming no changes in the relative returns to schooling across regions. Second, the Appalachian region has become more diverse in terms of racial composition, mainly the addition of more non-white and non-blacks, as well as the growth of white Hispanics. Borjas (2004) shows that the South experienced marked increases in immigrants during the 1990s both from increases in the number of newly-arrived persons as well as internal migration to the South. Moreover, these new immigrants were much more likely to settle in the Appalachian South than states that historically received immigrants such as Florida and Texas. Because these immigrants tend to be low skilled, then changes in the composition of the workforce to less skilled immigrants could possibly exacerbate regional wage differences. Third, there is a large secular decline in marriage rates across the board, which is somewhat more pronounced among men in Appalachia. The fraction of married men fell by 12 percentage points over the past two decades in Appalachia compared to a 10 percentage point decline outside Appalachia.

IV. Changes in the Returns to Skill, 1980-2000

We are interested in understanding how the market returns to observed skill have evolved over time within and between Appalachia and the rest of the nation, and how changes in those returns interact with changes in skill levels to help understand the reasons for changing wage differentials. We thus begin by estimating the standard human capital wage equation for men and women separately as:

(1) See equation below

where lnW is the natural log of the real average hourly wage rate for individual i residing in region r (Appalachia and Non-Appalachia) during Decennial Census year t. In sensitivity analyses the regions of interest include urban versus rural, and urban versus rural within the Fourth District. The control variates include four indicators for education (ED), with less than high school as the omitted group, a quartic in experience (Exper), five indicators for race (White, non Hispanic is the omitted group), an indicator if the individual resides in an MSA, and an indicator if the individual is married. We also report on models that include industry controls so that we can examine the role that dif-

$$\ln W_{irt} = \mathrm{b}_{rt0} + \sum_{k=1}^{4} ED_{irtk} * \mathrm{b}_{rt1k} + \sum_{j=1}^{4} Exper_{irt}^{j} * \mathrm{b}_{rt2j} + \sum_{l=1}^{5} RACE_{irtl} * \mathrm{b}_{rt3l} + MSA_{irt} * \mathrm{b}_{rt4} + Married * \mathrm{b}_{rt5} + \mathrm{e}_{irt}$$

ferences and changes in industry composition have on the earnings of workers in Appalachia.

To fix ideas in Table 2 (page 14) we report estimated returns to skill for men and women for the nation as a whole. Relative to high school dropouts the returns to schooling rose for all education groups between 1980 and 2000 for both men and women. The largest gains in education returns accrued to those with Bachelors degrees or advanced degrees. In 1980 the typical man (woman) with a Bachelors degree earned about 53 (61) percent more than the typical dropout, and this rose to 68 (74) percent by 2000. This result has been well established in the literature as one of the major factors accounting for the rise in inequality. Interpreting the coefficients on the quartic in experience are difficult, so in Figures 4 and 5 (pages 13-14) we simulate the returns to potential experience for men and women over the past three decades. For both men and women the returns to experience fell in 1990 relative to 1980, and then increased in 2000 to levels higher than in 1980 for men with at least 30 years of experience and for women with at least 10 years of experience.

In Tables 3a–3c (pages 17-19) we present weighted least squares estimates of equation (1), along with robust standard errors, where the weights for the Appalachian sample are the share of the respective PUMA's population contained within Appalachia and the weight for the non-Appalachian sample is one minus the Appalachian weight. We highlight the returns to schooling coefficients in Figures 6 and 7 (pages 15-16), which make transparent the large increase in the relative return to some college or better in the 1980s for both men and women, within and outside Appalachia. Whether based on real and perceived perceptions of Appalachian poverty, some might find surprising the fact that the returns to education in 1980

Figure 4: Returns to Experience among Men in the United States

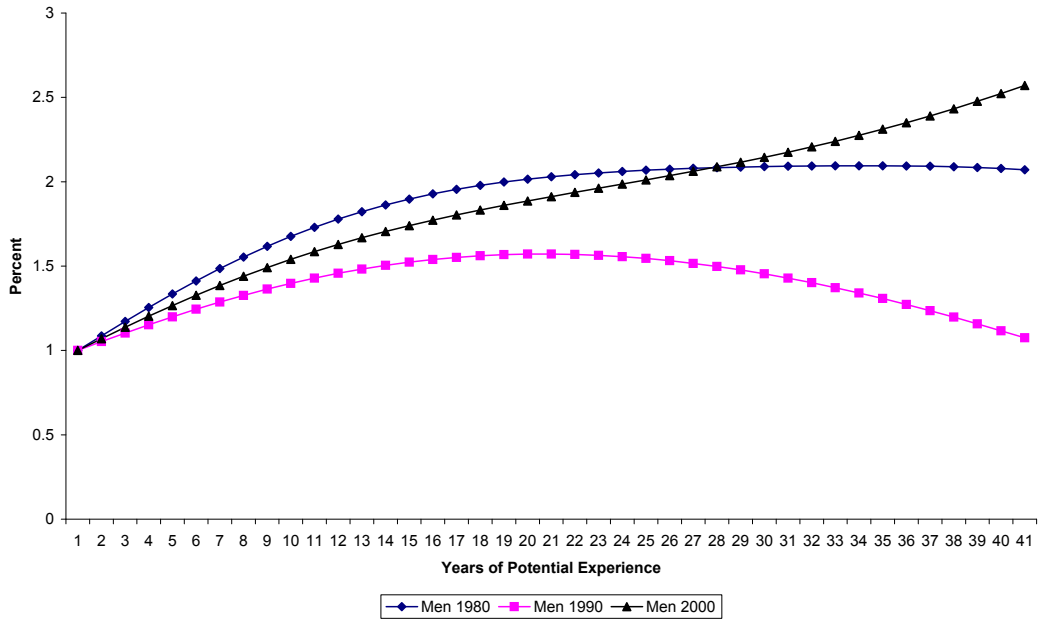
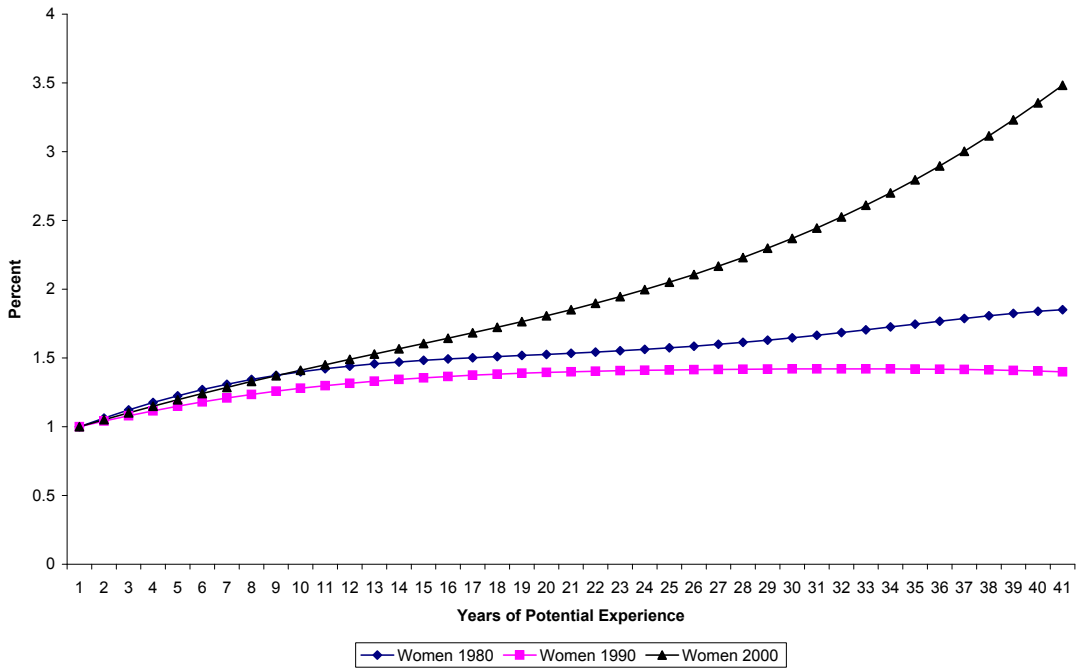


Table 2: Estimated Returns to Skill for Men and Women in the United States

	Men			Women		
	1980	1990	2000	1980	1990	2000
High School	0.210***	0.236***	0.217***	0.192***	0.221***	0.212***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Some College	0.305***	0.364***	0.367***	0.340***	0.411***	0.414***
	(0.002)	(0.002)	(0.002)	(0.0020)	(0.002)	(0.002)
Bachelors Degree	0.533***	0.647***	0.681***	0.606***	0.711***	0.741***
	(0.002)	(0.002)	(0.002)	(0.0020)	(0.002)	(0.002)
Masters or more	0.634***	0.833***	0.883***	0.810***	0.939***	0.950***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
White, Hispanic	-0.190***	-0.208***	-0.189***	-0.049***	-0.075***	-0.083***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Black, non-Hispanic	-0.192***	-0.188***	-0.164***	-0.011***	-0.036***	-0.028***
	(0.002)	(0.002)	(0.001)	(0.0020)	(0.001)	(0.001)
Black, Hispanic	-0.332***	-0.255***	-0.196***	-0.044*	-0.048***	-0.019
	(0.020)	(0.012)	(0.011)	(0.021)	(0.012)	(0.011)
Other, non-Hispanic	-0.145***	-0.142***	-0.120***	-0.020***	-0.019***	-0.023***
	(0.004)	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)
Other, Hispanic	-0.199***	-0.172***	-0.209***	-0.055***	-0.029*	-0.100***
	(0.010)	(0.013)	(0.002)	(0.011)	(0.013)	(0.002)
Experience	0.087***	0.053***	0.070***	0.065***	0.042***	0.052***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Experience squared	-0.004***	-0.002***	-0.003***	-0.004***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Experience cubed (000's)	0.085***	0.030***	0.066***	0.113***	0.045***	0.057***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Experience quartic (0000's)	-0.007***	-0.003***	-0.005***	-0.011***	-0.004***	-0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
MSA	0.180***	0.200***	0.180***	0.146***	0.203***	0.195***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Married	0.195***	0.193***	0.182***	-0.030***	-0.018***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	1.564***	1.584***	1.621***	1.577***	1.546***	1.563***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)
R-squared	0.123	0.191	0.192	0.094	0.16	0.172
Number of Observations	1.85E+06	2.43E+06	2.78E+06	1.43E+06	2.15E+06	2.54E+06

and 1990 are quite com-pa-rable

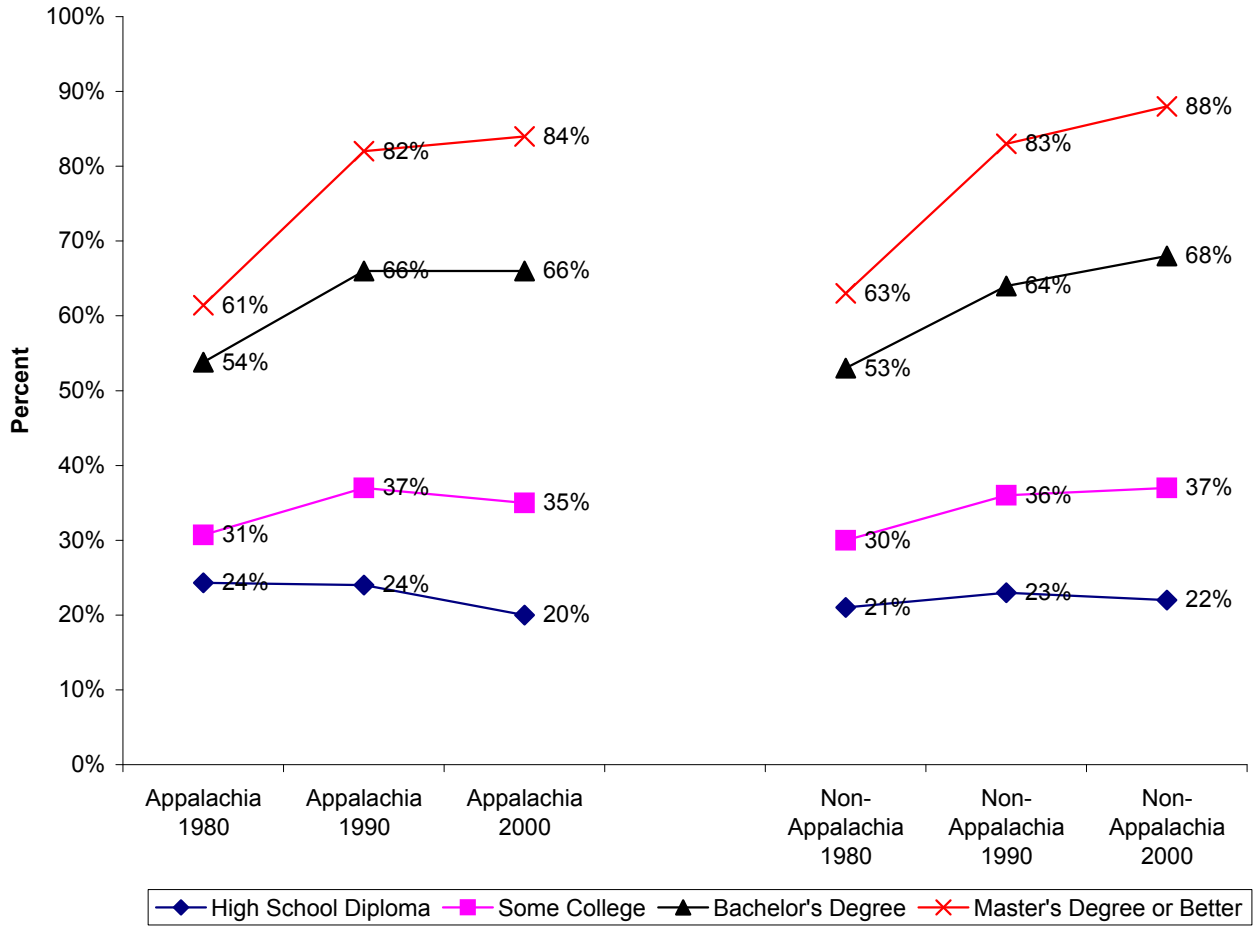
Figure 5: Returns to Experience among Women in the United States



across regions. However, economic models of migration certainly predict such equilibrating returns. At the same time, among both men and women, returns to schooling across all levels stabilized (and fell at some levels) in the 1990s in Appalachia, but they continued to rise outside Appalachia, at least at the Bachelors and Masters levels. The declining returns were particularly sharp among Appalachians with only a high school diploma. This divergence in schooling returns will exacerbate within region inequality, but it is less clear whether it will exacerbate between-region inequality given the relative rise in education attainment in Appalachia.

Examining the other coefficients in Tables 3a-3c, and as previewed in Figures 4 and 5 (pages 13-14), major changes occurred over time in the returns to potential experience, and these changes have not been uniform across regions and genders. We highlight this in Figures 8 and 9 (page 20), which depict the predicted experience profiles for workers with up to 40 years of labor-market experience. At 20 years of experience the predicted return for men in Appalachia is nearly 30 percent lower in 1990 (1.67 percent) compared to 1980 (2.31 percent), while for a women with the same level of experience in Appalachia

Figure 6: Percentage Wage Gain Relative to High School Dropout for Men, Appalachia versus Non-Appalachia



we find her returns to experience rose by 36 percent to 1.71 percent. The decline in the returns to experience among men appears to have been more substantial among workers in Appalachia than in the rest of the nation, perhaps due to the hard recession in the coal and steel industries in the 1980s (Black et al. 2005). This result may also be due to changes in the labor force participation among men, which may be more pronounced in Appalachia.

Tables 3a–3c also make clear that most racial groups earn lower hourly wages than white non-Hispanics, but these gaps appear to be larger outside of Appalachia, at least after 1980. In addition, the premium associated with residing in a metropolitan statistical area is much more pronounced outside of Appalachia for both men and women. However, being married pays off more for men in Appalachia than those outside of the region, though the relative difference in the marriage premium fell from 23 percent in 1980 to only 5 percent in 2000 because of a secular decline in the returns to marriage among men in Appalachia. Both the rates of marriage and the returns to marriage for Appalachian men have fallen over the past two decades.

Figure 7: Percentage Wage Gain Relative to High School Dropout for Women, Appalachia versus Non-Appalachia

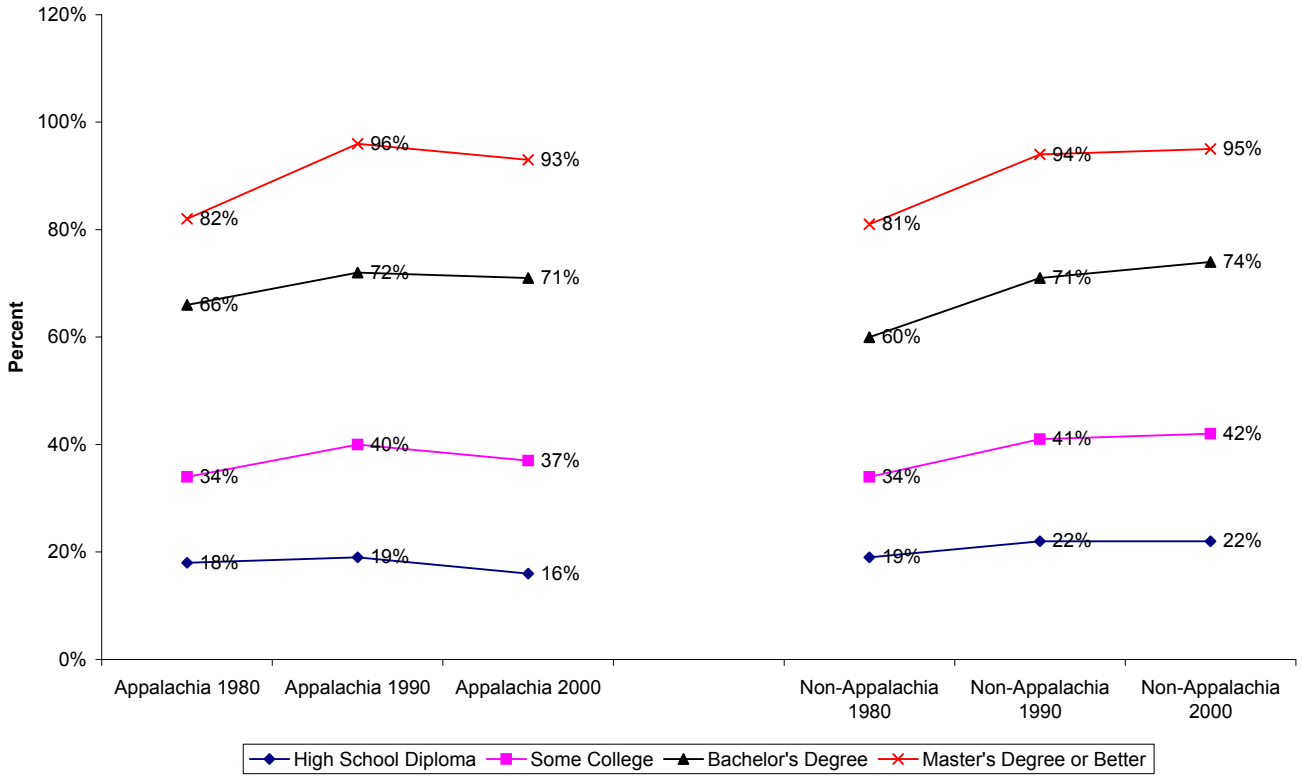


Table 3a: Estimated Returns to Skill for Men and Women in 1980

	Men		Women	
	Appalachia	Non-Appalachia	Appalachia	Non-Appalachia
High School	0.243***	0.205***	0.177***	0.193***
	(0.005)	(0.002)	(0.005)	(0.002)
Some College	0.307***	0.302***	0.342***	0.338***
	(0.006)	(0.002)	(0.007)	(0.002)
Bachelors Degree	0.538***	0.530***	0.657***	0.601***
	(0.006)	(0.002)	(0.008)	(0.002)
Masters or more	0.614***	0.632***	0.818***	0.808***
	(0.009)	(0.003)	(0.012)	(0.003)
White, Hispanic	-0.034	-0.196***	-0.058	-0.053***
	(0.029)	(0.003)	(0.031)	(0.003)
Black, non-Hispanic	-0.223***	-0.192***	-0.065***	-0.010***
	(0.009)	(0.002)	(0.008)	(0.002)
Black, Hispanic	-0.385**	-0.334***	-0.174	-0.042*
	(0.135)	(0.020)	(0.138)	(0.021)
Other, non-Hispanic	-0.054*	-0.150***	-0.075**	-0.022***
	(0.027)	(0.004)	(0.029)	(0.004)
Other, Hispanic	-0.244*	-0.203***	-0.295**	-0.057***
	(0.107)	(0.010)	(0.098)	(0.011)
Experience	0.098***	0.085***	0.045***	0.066***
	(0.004)	(0.001)	(0.004)	(0.001)
Experience squared	-0.005***	-0.004***	-0.003***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Experience cubed (000's)	0.136***	0.079***	0.081***	0.115***
	(0.009)	(0.003)	(0.010)	(0.003)
Experience quartic (0000's)	-0.013***	-0.007***	-0.008***	-0.011***
	(0.001)	(0.001)	(0.001)	(0.001)
MSA	0.116***	0.183***	0.070***	0.150***
	(0.003)	(0.001)	(0.004)	(0.001)
Married	0.238***	0.193***	-0.002	-0.032***
	(0.005)	(0.001)	(0.004)	(0.001)
Constant	1.520***	1.571***	1.654***	1.572***
	(0.018)	(0.005)	(0.020)	(0.006)
R-squared	0.100	0.125	0.095	0.092
Number of Observations	1.85E+05	1.74E+06	1.36E+05	1.36E+06

V. Decomposing Changes in Average Wages

The estimates from equation (1) inform us how the average rates of return to schooling and experience differ across regions of the country and over time. They are also a key input into the second part of our analysis involving wage decompositions. In this section we focus on decomposing differences in mean outcomes, and in the next section we decompose differences in the distribution of wages.

To compare differences in average wages between two populations (for example, Appalachia and non-Appalachia,

Table 3b: Estimated Returns to Skill for Men and Women in 1990

	Men		Women	
	Appalachia	Non-Appalachia	Appalachia	Non-Appalachia
High School	0.244***	0.234***	0.192***	0.224***
	(0.004)	(0.002)	(0.005)	(0.002)
Some College	0.372***	0.360***	0.398***	0.410***
	(0.005)	(0.002)	(0.005)	(0.002)
Bachelors Degree	0.660***	0.643***	0.721***	0.707***
	(0.006)	(0.002)	(0.006)	(0.002)
Masters or more	0.817***	0.830***	0.956***	0.935***
	(0.007)	(0.002)	(0.007)	(0.002)
White, Hispanic	-0.116***	-0.216***	-0.016	-0.082***
	(0.021)	(0.002)	(0.021)	(0.002)
Black, non-Hispanic	-0.161***	-0.192***	-0.047***	-0.038***
	(0.007)	(0.002)	(0.006)	(0.002)
Black, Hispanic	-0.114	-0.264***	0.028	-0.057***
	(0.156)	(0.012)	(0.127)	(0.012)
Other, non-Hispanic	-0.047*	-0.149***	-0.064**	-0.024***
	(0.019)	(0.002)	(0.020)	(0.002)
Other, Hispanic	-0.118	-0.180***	0.091	-0.037**
	(0.126)	(0.013)	(0.141)	(0.013)
Experience	0.043***	0.054***	0.037***	0.043***
	(0.004)	(0.001)	(0.004)	(0.001)
Experience squared	-0.001***	-0.002***	-0.001***	-0.002***
	0.000	0.000	0.000	0.000
Experience cubed (000's)	0.009	0.031***	0.028***	0.046***
	(0.007)	(0.002)	(0.009)	(0.003)
Experience quartic (0000's)	-0.001	-0.003***	-0.002*	-0.004***
	(0.001)	0.000	(0.001)	0.000
MSA	0.079***	0.207***	0.077***	0.209***
	(0.003)	(0.001)	(0.003)	(0.001)
Married	0.213***	0.192***	0.002	-0.019***
	(0.003)	(0.001)	(0.003)	(0.001)
Constant	1.599***	1.586***	1.550***	1.548***
	(0.017)	(0.005)	(0.017)	(0.005)
R-squared	0.157	0.193	0.145	0.158
Number of Observations	2.40E+05	2.29E+06	2.08E+05	2.03E+06

or Appalachia in 1990 and Appalachia in 2000) we employ the standard approach from Oaxaca (1973) and Blinder (1973) that permit us to decompose wage gaps into differences in the rates of return (the β's in the equation above) and differences in the observable characteristics (the explanatory variables such as education). For example, let $\ln \bar{W}_t^A$ be the average wage in Appalachia in year t and $\ln \bar{W}_t^{NA}$ be the average wage in year t outside Appalachia. Assuming that the vector of demographics and associated coefficients are then the non-Appalachian–Appalachian wage gap at predicted values is

(2) $$\ln \bar{\hat{W}}^{NA} - \ln \bar{\hat{W}}^{A} = (\bar{X}^{NA} - \bar{X}^{A})\hat{b}^{NA} + \bar{X}^{A}(\hat{b}^{NA} - \hat{b}^{A})$$

where the first term represents the wage gain accruing to higher skills among non-Appalachians and the second term

Table 3c: Estimated Returns to Skill for Men and Women in 2000

	Men		Women	
	Appalachia	Non-Appalachia	Appalachia	Non-Appalachia
High School	0.204***	0.218***	0.164***	0.217***
	(0.004)	(0.002)	(0.005)	(0.002)
Some College	0.346***	0.366***	0.374***	0.416***
	(0.005)	(0.002)	(0.006)	(0.002)
Bachelors Degree	0.655***	0.680***	0.706***	0.741***
	(0.005)	(0.002)	(0.006)	(0.002)
Masters or more	0.836***	0.883***	0.933***	0.949***
	(0.007)	(0.002)	(0.007)	(0.002)
White, Hispanic	-0.139***	-0.196***	-0.02	-0.091***
	(0.013)	(0.002)	(0.018)	(0.002)
Black, non-Hispanic	-0.116***	-0.170***	-0.005	-0.033***
	(0.005)	(0.001)	(0.005)	(0.001)
Black, Hispanic	-0.243***	-0.201***	0.076	-0.028*
	(0.071)	(0.011)	(0.068)	(0.011)
Other, non-Hispanic	-0.080***	-0.127***	-0.029*	-0.029***
	(0.011)	(0.002)	(0.012)	(0.002)
Other, Hispanic	-0.182***	-0.217***	-0.014	-0.109***
	(0.013)	(0.002)	(0.019)	(0.002)
Experience	0.064***	0.070***	0.037***	0.053***
	(0.004)	(0.001)	(0.004)	(0.001)
Experience squared	-0.003***	-0.003***	-0.001***	-0.003***
	0.000	0.000	0.000	0.000
Experience cubed (000's)	0.062***	0.066***	0.031***	0.058***
	(0.008)	(0.002)	(0.008)	(0.002)
Experience quartic (0000's)	-0.005***	-0.005***	-0.003**	-0.005***
	(0.001)	0.000	(0.001)	0.000
MSA	0.087***	0.184***	0.093***	0.200***
	(0.002)	(0.001)	(0.003)	(0.001)
Married	0.191***	0.182***	0.023***	0.007***
	(0.003)	(0.001)	(0.003)	(0.001)
Constant	1.633***	1.625***	1.627***	1.562***
	(0.017)	(0.005)	(0.016)	(0.005)
R-squared	0.169	0.193	0.162	0.171
Number of Observations	2.61E+05	2.61E+06	2.38E+05	2.39E+06

reflects higher returns to those skills. As is common in the discrimination literature, the decomposition is sensitive to the choice of skill returns used as the reference price vector. Equation (2) uses non-Appalachian prices as the reference case, and the analogous decomposition with Appalachian prices is

(3) $\ln \bar{\hat{W}}^{NA} - \ln \bar{\hat{W}}^{A} = (\bar{X}^{NA} - \bar{X}^{A})\hat{b}^{A} + \bar{X}^{NA}(\hat{b}^{NA} - \hat{b}^{A})$ [2]

In Table 4 (page 21) we report the mean decompositions for each year from equations (2)–(3) along with the associated standard errors derived by Jann

2. An alternative to the latter two approaches is to use a three-fold decomposition as $\ln \bar{\hat{W}}^{NA} - \ln \bar{\hat{W}}^{A} = (\bar{X}^{NA} - \bar{X}^{A})\hat{b}^{A} + \bar{X}^{A}(\hat{b}^{NA} - \hat{b}^{A}) + (\bar{X}^{NA} - \bar{X}^{A})'(\hat{b}^{NA} - \hat{b}^{A})$ where the third term admits the possibility of a covariance between skill levels and skill returns. In practice the interaction term gets allocated to the skill gap when non-Appalachian prices are the reference group in equation (2) and to the returns gap when Appalachian prices are the reference group in (3).

Figure 8: Returns to Experience among Men within and outside of Appalachia

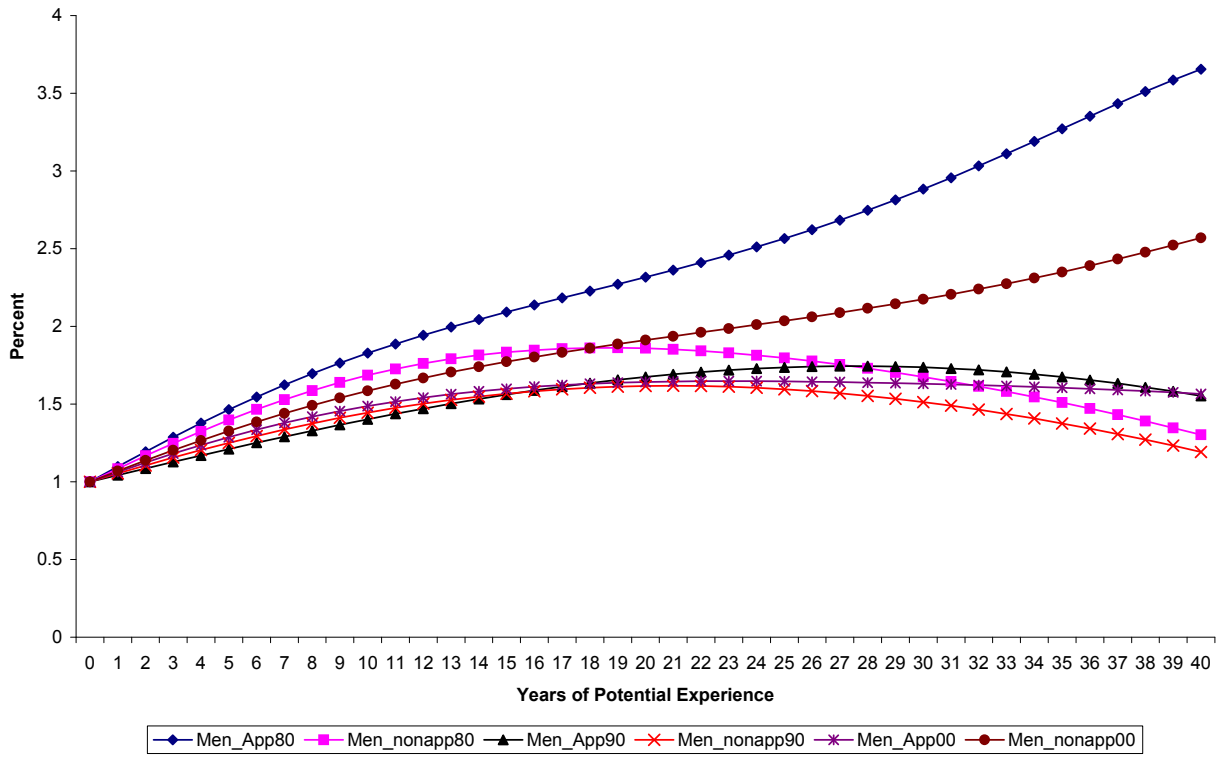


Figure 9: Returns to Experience among Women within and outside of Appalachia

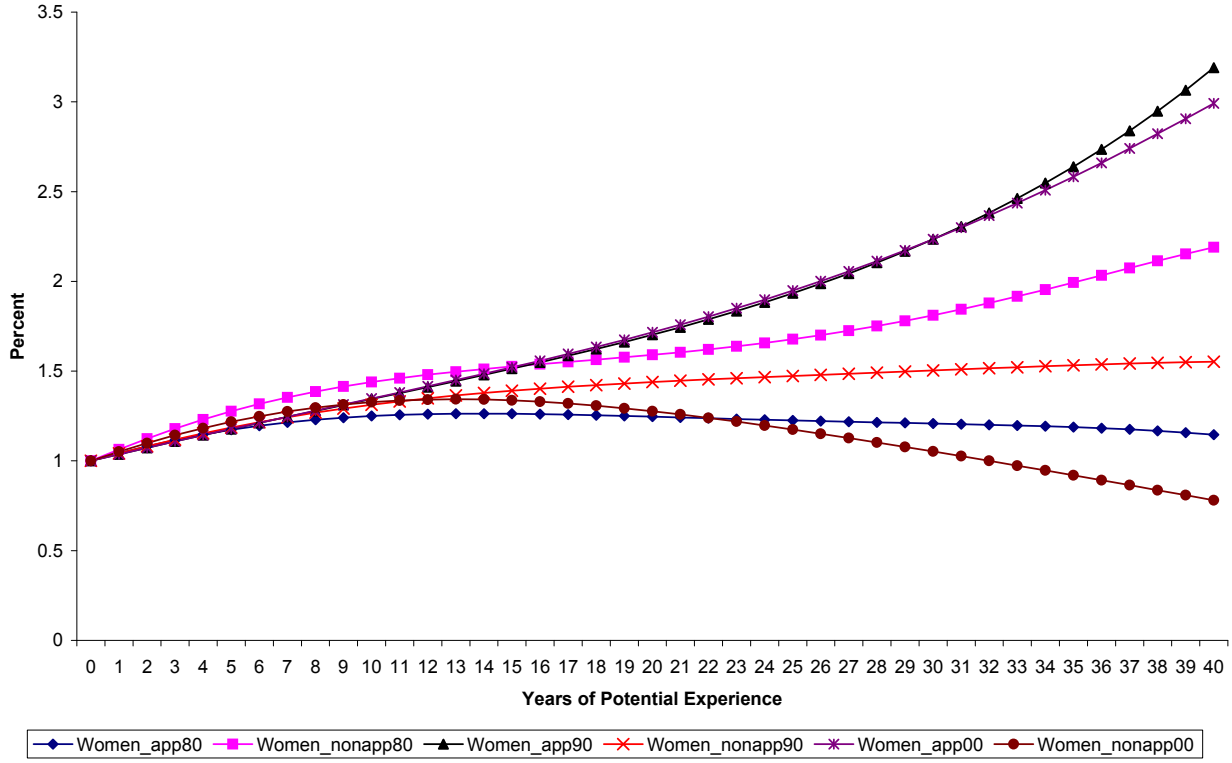


Table 4: Oaxaca-Blinder Decomposition of Average Wage Gaps between non-Appalachian and Appalachian Workers

Men, non-Appalachia as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.096	0.064	67%	0.032	33%
		(0.001)		(0.002)	
1990	0.122	0.071	58%	0.052	42%
		(0.001)		(0.001)	
2000	0.122	0.059	48%	0.063	52%
		(0.001)		(0.001)	

Men, Appalachia as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.096	0.048	50%	0.048	50%
		(0.002)		(0.002)	
1990	0.122	0.040	33%	0.082	67%
		(0.002)		(0.002)	
2000	0.122	0.035	29%	0.087	71%
		(0.001)		(0.002)	

Women, non-Appalachia as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.121	0.084	70%	0.037	30%
		(0.001)		(0.002)	
1990	0.166	0.105	63%	0.061	37%
		(0.001)		(0.001)	
2000	0.157	0.089	57%	0.068	43%
		(0.001)		(0.001)	

Women, Appalachia as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.121	0.056	47%	0.065	53%
		(0.002)		(0.003)	
1990	0.166	0.068	41%	0.098	59%
		(0.002)		(0.002)	
2000	0.157	0.067	43%	0.090	57%
		(0.001)		(0.002)	

Note: Standard Errors are provided in parentheses

(2005). The table shows the actual log wage gap, the portion of the gap due to differences in skill levels, and the portion due to differences in skill returns. For both men and women, we report the gap first based on non-Appalachian skill returns as the reference group and second based on the Appalachian returns. The actual wage gap rose nearly 30 percent between 1980 and 1990, but held steady throughout the 1990s. In 1980 about two-thirds of the wage gap of 0.096 was due to skill shortfalls among Appalachian men, and one-third due to regional differences in skill returns. By 2000, however, Appalachian men gained ground on non-Appalachian men in terms of skill levels such that the portion due to skill differences fell by 20 percentage points and the portion due to skill returns rose a comparable amount. A similar result obtains when using Appalachian returns as the reference prices, and thus the evidence points towards the important role of skill upgrading during the 1980s and 90s.

The actual wage gap between non-Appalachian women and Appalachian women is both larger than that of men, and widened more in the 1980s than men. However, the gap narrowed in the 1990s such that by 2000 the percentage increase in the wage gap of women was about the same as men. A similar pattern is also obtained in that over the past two decades the fraction of the observed wage gap becomes less determined by regional differences in skill levels and more in skill returns, though the skill gap still accounts for between 43 and 57 percent of the total gap for women depending on which group serves as the reference.

In Tables 5a and 5b (pages 23-24) we present Oaxaca-Blinder decompositions within and between each region over time for men and women. Examining changes in Appalachia or outside Appalachia over time adds to our understanding of changes in within-region inequality over the past two decades. We also examine the long-term change in between-region wage differences by comparing how men and women in Appalachia in 2000 compare to their counterparts outside the region in 1980. In Table 5a we see that wages fell 0.059 log points for men in Appalachia between 1980 and 1990. The decomposition suggests that increases in skill levels in the region pushed towards wage growth in the 1980s, but this effect was swamped by declining returns to skill. As Table 3 indicated, returns to experience fell in the 1980s, which pulled down mean wages. On the other hand, the 0.068 log point growth in the 1990s was equally shared by growing skill levels and a recovery in the returns to skill, especially experience. A very similar story prevailed among men outside of Appalachia in each of the last two decades, the only difference being that slightly more of the wage growth in the 1990s can be attributed to rising skill returns. The last panel in Table 5a shows that Appalachian men in 2000 still earned 0.087 log points less than non-Appalachian men in 1980, and when non-Appalachia serves as the reference group then nearly all the gap is explained by skill differences, and when Appalachia in 2000 is the reference price vector all the gap is explained by returns. This implies that if the average Appalachian man in 2000 was given the skill set of the typical non-Appalachian man in 1980 and the returns on those skills, then his wages would be roughly the same as they actu-

Table 5a: Oaxaca-Blinder Decomposition of Average Wage Gaps of Men over Time

Men in Appalachia

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1990-1980	-0.059	0.027	-46%	-0.086	146%
(1990 as reference)		(0.001)		(0.002)	
1990-1980	-0.059	0.036	-61%	-0.095	161%
(1980 as reference)		(0.001)		(0.001)	
2000-1990	0.068	0.031	45%	0.038	55%
(2000 as reference)		(0.001)		(0.002)	
2000-1990	0.068	0.034	50%	0.034	50%
(1990 as reference)		(0.002)		(0.002)	

Men in Non-Appalachia

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1990-1980	-0.033	0.016	-48%	-0.049	148%
(1990 as reference)		(0.001)		(0.001)	
1990-1980	-0.033	0.018	-55%	-0.051	155%
(1980 as reference)		(0.001)		(0.001)	
2000-1990	0.068	0.021	31%	0.047	69%
(2000 as reference)		(0.001)		(0.001)	
2000-1990	0.068	0.029	43%	0.039	57%
(1990 as reference)		(0.001)		(0.001)	

Men in Non-Appalachia 1980 Compared to Men in Appalachia in 2000

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980 Non-Appalachia as Reference	0.087	0.085	98%	0.002	2%
		(0.001)		(0.002)	
2000 Appalachia as Reference	0.087	-0.006	-7%	0.093	107%
		(0.001)		(0.002)	

ally were in 2000. That is, skill upgrading has reduced between-region average wage differentials.

Although the wages of women inside and outside of Appalachia grew in both the 1980s and 1990s, rather than falling and then rising as we saw for men, the sources for changes in within-region wage differentials among women are broadly consistent with men. Table 5b shows that the wage gains in the 1980s are largely driven by skill upgrading, but the gains in the 1990s are due to rising returns to skill. Over the long term, the share of between-region average wage differences is more evenly split between skill upgrading and increasing returns to skill than we found with men, but at least two-thirds is attributed to skill convergence of women in Appalachia with women in the rest of the nation.

Table 5b: Oaxaca-Blinder Decomposition of Average Wage Gaps of Women over Time

Women in Appalachia

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1990-1980	0.034	0.068	200%	-0.034	-100%
(1990 as reference)		(0.001)		(0.002)	
1990-1980	0.034	0.058	171%	-0.024	-71%
(1980 as reference)		(0.001)		(0.002)	
2000-1990	0.166	0.063	38%	0.103	62%
(2000 as reference)		(0.001)		(0.002)	
2000-1990	0.166	0.061	37%	0.105	63%
(1990 as reference)		(0.001)		(0.002)	

Women in Non-Appalachia

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1990-1980	0.079	0.061	77%	0.018	23%
(1990 as reference)		(0.001)		(0.001)	
1990-1980	0.079	0.053	67%	0.026	33%
(1980 as reference)		(0.001)		(0.001)	
2000-1990	0.157	0.056	36%	0.101	64%
(2000 as reference)		(0.001)		(0.001)	
2000-1990	0.157	0.058	37%	0.099	63%
(1990 as reference)		(0.001)		(0.001)	

Women in Non-Appalachia 1980 Compared to Women in Appalachia in 2000

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
2000 Appalachia as Reference	0.079	0.056	71%	0.023	29%
		(0.001)		(0.002)	
1980 Non-Appalachia as Reference	0.079	0.025	32%	0.054	68%
		(0.001)		(0.001)	

VI. Decomposing Changes in Wage Distributions in Appalachia and Non-Appalachia

The Oaxaca-Blinder decomposition focuses upon differences in the average wages between two groups. As noted in Black and Sanders (2004) there have been important changes throughout the earnings distribution in Appalachia (and indeed, throughout the country as demonstrated in the large inequality literature). We thus extend our previous analysis to decompose changes in the entire wage distribution using quantile regression techniques and the methodology of Machado and Mata (2005), hereafter denoted as MM.

The value of examining the wage distribution is that we observed that the rate of return to education has increased in Appalachia on average, which may reflect that it shifted up among all per-

sons, or it may be that the lowest rates of return have improved dramatically, but the highest rates have not. The latter might imply that improvement in school quality has focused upon the worst schools in the region. In contrast, if the improvement is focused upon the highest quantiles, this suggests that improvements in school quality were mostly concentrated on the already highest achieving schools. Understanding these distinctions has important implications for the role of increasing skill levels versus rising returns to skill across the distribution.

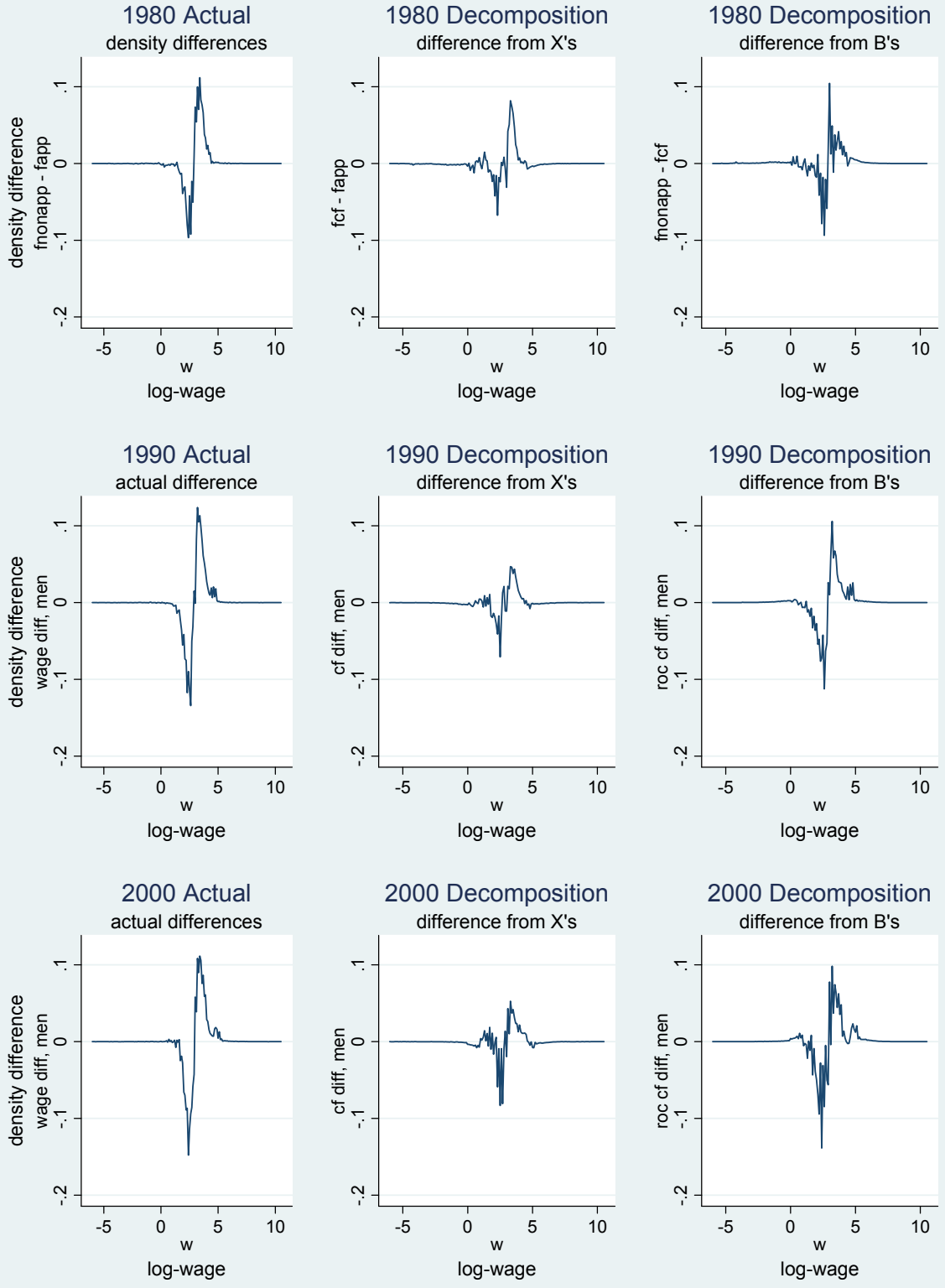
The basic idea of the MM procedure is to estimate quantiles of the conditional wage distribution, and given the estimated coefficients, conduct a series of counterfactual decompositions of the distribution by simulating out the marginal wage distributions under alternative scenarios. This approach differs from DiNardo, et al. (1996) in that they estimate the wage models with nonparametric kernel densities and are not able to separately identify the contributions of variables compared to coefficients. Autor, Katz and Kearney (2005) extend the MM approach for wage distributions by separately identifying the contribution of unobserved skills (i.e. residual inequality) in the spirit of Juhn, Murphy, and Pierce (1993). At this time we focus on the more transparent MM approach of decomposing wages based on observed differences.

To implement the MM procedure we estimate equation (1) via quantile regressions for 99 points of the wage distribution from 0.01 to 0.99 using the data for the Appalachian region in all three time periods. This presents the Appalachian returns to skills and demographics. We then construct a counterfactual distribution using skill and demographic characteristics drawn from the non-Appalachian region by first drawing observations randomly (with replacement) from the non-Appalachian data. Additionally, we randomly assign a quantile, q, (.01 through .99) to each drawn observation. Then we generate a predicted wage using the quantile coefficients indicated by that observation's q, and the demographic (X) variables of that observation. This generates a distribution of wages that represents the distribution of wages if individuals in Appalachia had the same distribution of X's as the non-Appalachian region. The procedure is comparable to the term in a standard Oaxaca-Blinder decomposition. We can then compare differences in the actual Appalachian wage distribution to this counter-factual distribution: differences are solely due to differences in skills and demographics and are comparable to the term in the Oaxaca-Blinder decomposition in equation (3) with Appalachia as the reference price vector. We can also compare differences in the counterfactual distribution and the actual wage distribution of the rest of the country: differences are solely due to returns to skills and demographics and are comparable to the term in the Oaxaca-Blinder decomposition. An important distinction, however, is that we construct the decomposition for each of the 99 conditional quantiles and not just at the mean values as in equations (2) and (3). We use standard kernel density estimators of the 99 quantile points to arrive at the figures discussed here.

Figure 10 (next page) presents com-

Figure 10: Male Distribution Comparison

Using Appalachia as Counterfactual



parisons of wage distributions for men. Each row contains the difference in log-wage distributions (non-Appalachia less Appalachia) for a particular year. This figure is comparable to the second row of Table 4 (using Appalachia as the reference). The first column presents the differences in the actual log-wage distributions between the non-Appalachian and Appalachian regions – like the first column of Table 4 labeled "Actual Difference." The second column compares the counterfactual distribution constructed using non-Appalachian X variables and Appalachian returns ( ) to the actual Appalachian wage distribution – like the second column of Table 4 labeled "Skills Gap." The third column compares the counterfactual distribution and the actual non-Appalachian wage distribution – like the fourth column of Table 4 labeled "Returns Gap." The graphs in the second and third columns represent the decomposition of the differences in the first column into the two parts: differences due to X's (skills) and differences due to (returns to skills and demographics). The difference between the results in Figure 10 and Table 4 are that we can observe which part of the wage distribution is driving the average difference.

The first panel of Figure 10 (first row, first column) displays the difference in the wage distributions between non-Appalachia and Appalachia. The negative values represent places where there is higher density for Appalachia than for non-Appalachia, while the positive values represent areas where there is higher density for non-Appalachia than for Appalachia. Hence, the first panel demonstrates that the distribution of wages for Appalachia is shifted to the left (or lower) of the distribution for non-Appalachia in 1980. The symmetry of the graph indicates that the Appalachian distribution is shifted down relatively uniformly along the wage (x) axis. Thus the average difference in Table 4 is not being driven only by a lack of high earners in Appalachia or only by a lack of low earners in non-Appalachia.

The second panel (first row, second column) displays the comparison of the counterfactual distribution to the Appalachian distribution for 1980. We first note that the magnitude of the differences is smaller in this graph as compared to the actual differences. Intuitively we can say that roughly half of the differences in the actual distribution are attributable to skills differences. More strikingly, however, is the lack of symmetry compared to the first graph. In the low-wage part of the distribution, the difference is quite close to zero, while in the high wage part of the distribution the difference is still quite large. This indicates that skill differences are a high-wage phenomenon. The difference in skill attainment explains the lack of high wage individuals in the Appalachian wage distribution. However, it does not explain the preponderance of low wage workers in the Appalachian wage distribution.

The third panel (row 1 column 3) of Figure 10 represents the returns gap. Like the second column, about 50 percent of the actual difference appears to be explained by the returns to skills and demographics. Here, though, we see that the negative portion of the graph is nearly as large as the first panel while the positive

portion is more muted. The differences in returns are a low-wage phenomenon. The differences in returns to skills explains why there are more low wage workers in Appalachia than non-Appalachia, but is less important in explaining the lack of high wage workers in Appalachia.

The first row of Figure 10 represents the case as it stood in 1980. As we move down the three rows we see that the magnitudes in the first column increase modestly between 1980 and 1990 but remain approximately constant between 1990 and 2000. This is consistent with the rise in the average wage gap between 1980 and 1990 in Table 4 and with the constant wage gap in 1990 and 2000. Most importantly, the first column remains symmetric: the distribution for Appalachian men is shifted down relatively uniformly such that the Appalachian wage gap is felt throughout the wage distribution.

The differences over time in the second and third column of Figure 10 are more striking. By 2000, the magnitude of the differences in the second column (the Skills Gap) is quite muted. Like Table 4, we see that skill differences are less important in explaining the overall wage gap by 2000. Indeed, even more striking than in 1980, the skills gap in 2000 appears to be nearly all concentrated at higher wages. The skills gap in 1990, however, is somewhat more pronounced for lower wage workers than either 1980 or 1990, while the skills gap for higher wage workers falls between 1980's and 1990's. This indicates that during the 1980's, the skills gap became more important for low wage (and presumably low skill) workers but evaporated by 2000.

With the skills gap declining, we see the returns gap rising consistently, but modestly for high wage workers. Mirroring the skills gap, the returns gap actually falls for low wage workers in 1990, but rises dramatically for low wage workers by 2000.

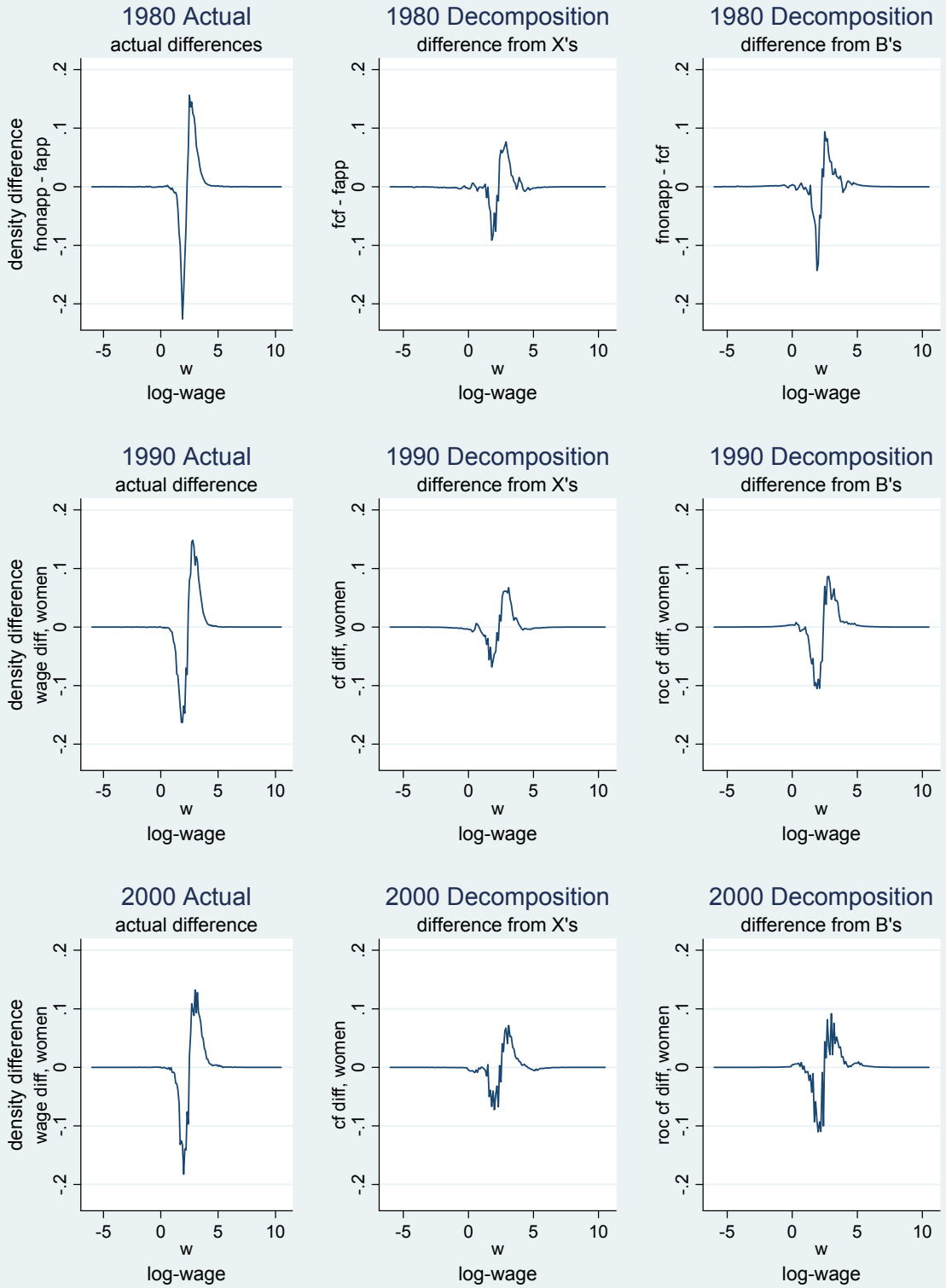
For men, the skills gap is a convergence story. It is least important – indeed nearly non-existent - for low wage workers, but decreasingly important among high wage workers as well. The returns gap has become more important throughout the wage distribution, but most important, indeed explains nearly all of the differences, for low wage workers. Thus we see that while much of the average difference story is confirmed by the distribution decomposition we learn that the returns gap is more important in explaining the preponderance of low wage male workers in Appalachia while the skills gap is important for explaining the lack of high wage workers in Appalachia.

Figure 11 (next page) presents similar graphs for women. As with men, the three graphs in the first column demonstrate that the wage distribution for women in Appalachia was lower than the distribution for women outside of Appalachia. As with men, the difference is symmetric and thus represents a relatively uniform shifting down of the overall wage distribution in Appalachia compared to the rest of the country. Like men, the magnitudes in the first column rise between 1980 and 1990, but remain largely constant to 2000. This is comparable to the average wage gap reported for women in Table 4.

The second column of Figure 11 repre-

Figure 11: Female Distribution Comparison

Using Appalachia as Counterfactual



sents the portion of the overall differences due to the skills gap. In sharp contrast to the men, we see that the graph is roughly symmetric and does not appear to change magnitude, relative to the overall gap in the first column, during the study period. The skills gap appears to be roughly half as large (magnitudes) as the overall gap. These findings are consistent with the relatively constant skills gap reported in the fourth panel of Table 4 (using Appalachia as the reference, as is done here). Thus unlike the men, the skills gap is not declining, and affects the entire wage distribution: the preponderance of low wage female workers in Appalachia is explained in part by a lack of skills and the lack of high wage workers in Appalachia is also explained by a lack of skills.

The third column represents the returns gap. It also is relatively constant through the study period and symmetric. Appalachian women also face a lower rate of return for (some of) their skills throughout the distribution. Thus the story for women is different than that for men. Unlike men, the skills gap did not decline and the returns gap did not rise through the study period. This is consistent with the results found in the decompositions in Table 4; namely, that the skills gap and the returns gap affect wages through the entire wage distribution for women.

VII. Is the Appalachian/Non-Appalachian Wage Gap an Urban-Rural Gap?

In this section of the report we examine how the market returns to skill have changed between 1980 and 2000 in more detailed geographic regions. In particular, using the same methodologies discussed in Sections IV and V we look at differences in changes in the returns to skill in urban and rural areas, for both the country as a whole as well as within the Appalachia region; differences in the returns to skill within and between Appalachia for states in the Federal Reserve's Fourth District and within and between Appalachia by state, for states within the Fourth District that have non-Appalachian regions: Kentucky, Ohio and Pennsylvania.

We start with Tables 6a-6c (pages 31-33) where we present least squares estimates of equation (1) separately for men and women in urban and rural areas. For our purposes we use the Beale urban-rural continuum code to distinguish urban from rural areas. If the county in the PUMA receives a Beale code of 3 or less, implying the county is located in a metro area, then that county is designated as urban. For counties with Beale codes greater than 3 they are designated as rural. In the 2000 Census about 17 percent of the U.S. population resided in counties with a Beale code of 4 or greater.

Focusing on the returns to schooling in Tables 6a-6c we can see that, for both men and women in both urban and rural areas, the returns to schooling rose fairly dramatically between 1980 and 1990. For example, the returns to a Bachelor's Degree for men in an urban area rose from 0.55 in 1980 to 0.68 in 1990, while for men living in a rural area the return rode from 0.46 in 1980 to 0.55 in 1990. However, turning to the returns to schooling between 1990 and 2000 we can see that they increased only for workers in urban areas. For the most part, the return to schooling remains constant or falls

over the 1990s for workers in rural areas. Focusing on women we see that the return to a Bachelor's Degree for women in rural areas in 1990 is 0.72 and in 2000 the return is 0.77. In contrast, the return to a Bachelor's Degree for women living in a rural area fell from 0.69 in 1990 to 0.66 in 2000. This is broadly consistent with the pattern of education results from the Appalachia/Non-Appalachia comparison in Tables 3a-3c. Figures 12 and 13 (page 34) record the returns to potential experience for men and women in urban and rural America. As we saw in Figure 8 for Appalachian men, there has been a collapse in the returns to experience in rural America, a reduction that is even more dramatic for rural areas than in Appalachia.

Table 6a: Estimated Returns to Skill for Men and Women in 1980

	Men		Women	
	Urban	Rural	Urban	Rural
High School	0.204***	0.210***	0.202***	0.158***
	(0.002)	(0.003)	(0.002)	(0.003)
Some College	0.310***	0.271***	0.349***	0.296***
	(0.002)	(0.004)	(0.002)	(0.004)
Bachelors Degree	0.546***	0.461***	0.597***	0.633***
	(0.002)	(0.004)	(0.003)	(0.005)
Masters or more	0.651***	0.539***	0.811***	0.804***
	(0.003)	(0.006)	(0.004)	(0.007)
White, Hispanic	-0.199***	-0.138***	-0.049***	-0.044***
	(0.003)	(0.007)	(0.003)	(0.008)
Black, non-Hispanic	-0.170***	-0.277***	0.006**	-0.090***
	(0.002)	(0.005)	(0.002)	(0.005)
Black, Hispanic	-0.305***	-0.502***	-0.024	-0.169*
	(0.020)	(0.066)	(0.021)	(0.075)
Other, non-Hispanic	-0.158***	-0.078***	-0.018***	-0.006
	(0.004)	(0.010)	(0.004)	(0.010)
Other, Hispanic	-0.208***	-0.131***	-0.057***	-0.024
	(0.010)	(0.027)	(0.012)	(0.032)
Experience	0.087***	0.072***	0.070***	0.045***
	(0.001)	(0.003)	(0.001)	(0.003)
Experience squared	-0.004***	-0.003***	-0.004***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
Experience cubed (000's)	0.079***	0.076***	0.121***	0.075***
	(0.003)	(0.005)	(0.003)	(0.007)
Experience quartic (0000's)	-0.007***	-0.007***	-0.012***	-0.008***
	(0.000)	(0.001)	(0.000)	(0.001)
MSA	0.049***	0.094***	0.051***	0.047***
	(0.002)	(0.005)	(0.003)	(0.006)
Married	0.188***	0.224***	-0.040***	0.010***
	(0.002)	(0.003)	(0.001)	(0.003)
Constant	1.674***	1.678***	1.653***	1.650***
	(0.006)	(0.012)	(0.007)	(0.013)
R-squared	0.126	0.075	0.082	0.080
Number of Observations	1.37E+06	4.74E+05	1.07E+06	3.61E+05

Table 6b: Estimated Returns to Skill for Men and Women in 1990

	Men		Women	
	Urban	Rural	Urban	Rural
High School	0.241***	0.225***	0.239***	0.182***
	(0.002)	(0.003)	(0.002)	(0.003)
Some College	0.381***	0.320***	0.433***	0.349***
	(0.002)	(0.003)	(0.002)	(0.003)
Bachelors Degree	0.676***	0.545***	0.719***	0.687***
	(0.002)	(0.004)	(0.002)	(0.004)
Masters or more	0.866***	0.707***	0.941***	0.937***
	(0.002)	(0.004)	(0.003)	(0.004)
White, Hispanic	-0.207***	-0.179***	-0.073***	-0.062***
	(0.002)	(0.005)	(0.002)	(0.005)
Black, non-Hispanic	-0.185***	-0.192***	-0.025***	-0.074***
	(0.002)	(0.004)	(0.002)	(0.003)
Black, Hispanic	-0.247***	-0.329***	-0.049***	-0.025
	(0.013)	(0.065)	(0.012)	(0.048)
Other, non-Hispanic	-0.159***	-0.059***	-0.022***	0.017**
	(0.003)	(0.007)	(0.003)	(0.006)
Other, Hispanic	-0.185***	-0.080*	-0.045***	0.083*
	(0.014)	(0.032)	(0.014)	(0.039)
Experience	0.056***	0.038***	0.044***	0.037***
	(0.001)	(0.002)	(0.001)	(0.002)
Experience squared	-0.002***	-0.001***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Experience cubed (000's)	0.035***	0.006	0.048***	0.033***
	(0.003)	(0.005)	(0.003)	(0.005)
Experience quartic (0000's)	-0.003***	0.000	-0.004***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.001)
MSA	0.032***	0.083***	0.041***	0.051***
	(0.002)	(0.008)	(0.002)	(0.009)
Married	0.194***	0.193***	-0.026***	0.009***
	(0.001)	(0.002)	(0.001)	(0.002)
Constant	1.713***	1.682***	1.691***	1.558***
	(0.006)	(0.011)	(0.006)	(0.011)
R-squared	0.198	0.113	0.137	0.121
Number of Observations	1.74E+06	6.89E+05	1.54E+06	6.07E+05

Table 6c: Estimated Returns to Skill for Men and Women in 2000

	Men		Women	
	Urban	Rural	Urban	Rural
High School	0.225***	0.195***	0.229***	0.164***
	(0.002)	(0.003)	(0.002)	(0.003)
Some College	0.392***	0.307***	0.441***	0.338***
	(0.002)	(0.003)	(0.002)	(0.003)
Bachelors Degree	0.721***	0.532***	0.765***	0.658***
	(0.002)	(0.004)	(0.002)	(0.004)
Masters or more	0.921***	0.727***	0.969***	0.889***
	(0.002)	(0.005)	(0.003)	(0.004)
White, Hispanic	-0.192***	-0.138***	-0.088***	-0.047***
	(0.002)	(0.005)	(0.002)	(0.006)
Black, non-Hispanic	-0.171***	-0.133***	-0.028***	-0.036***
	(0.002)	(0.003)	(0.001)	(0.003)
Black, Hispanic	-0.200***	-0.113**	-0.022	-0.009
	(0.011)	(0.041)	(0.011)	(0.047)
Other, non-Hispanic	-0.132***	-0.070***	-0.029***	0.004
	(0.002)	(0.005)	(0.002)	(0.004)
Other, Hispanic	-0.209***	-0.164***	-0.105***	-0.047***
	(0.002)	(0.005)	(0.002)	(0.006)
Experience	0.071***	0.057***	0.058***	0.024***
	(0.001)	(0.002)	(0.001)	(0.002)
Experience squared	-0.003***	-0.003***	-0.003***	-0.001***
	0.000	0.000	0.000	0.000
Experience cubed (000's)	0.064***	0.057***	0.067***	0.007
	(0.003)	(0.005)	(0.003)	(0.005)
Experience quartic (0000's)	-0.005***	-0.005***	-0.006***	0
	0.000	0.000	0.000	(0.001)
MSA	0.071***	0.083***	0.087***	0.052***
	(0.002)	(0.004)	(0.002)	(0.004)
Married	0.186***	0.170***	0.005***	0.021***
	(0.001)	(0.002)	(0.001)	(0.002)
Constant	1.693***	1.751***	1.629***	1.723***
	(0.006)	(0.011)	(0.005)	(0.010)
R-squared	0.201	0.112	0.159	0.127
Number of Observations	2.08E+06	7.02E+05	1.89E+06	6.47E+05

Figure 12: Returns to Experience among Men in Urban and Rural America

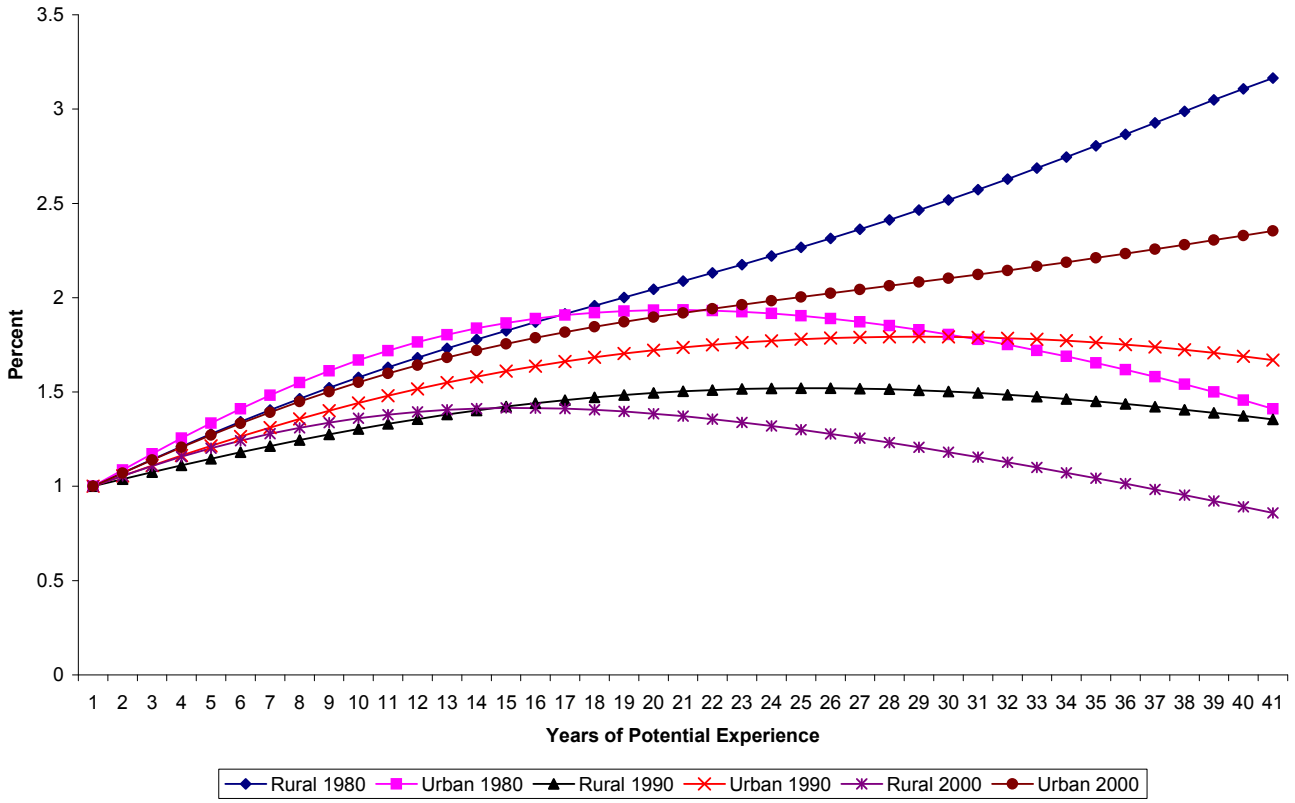
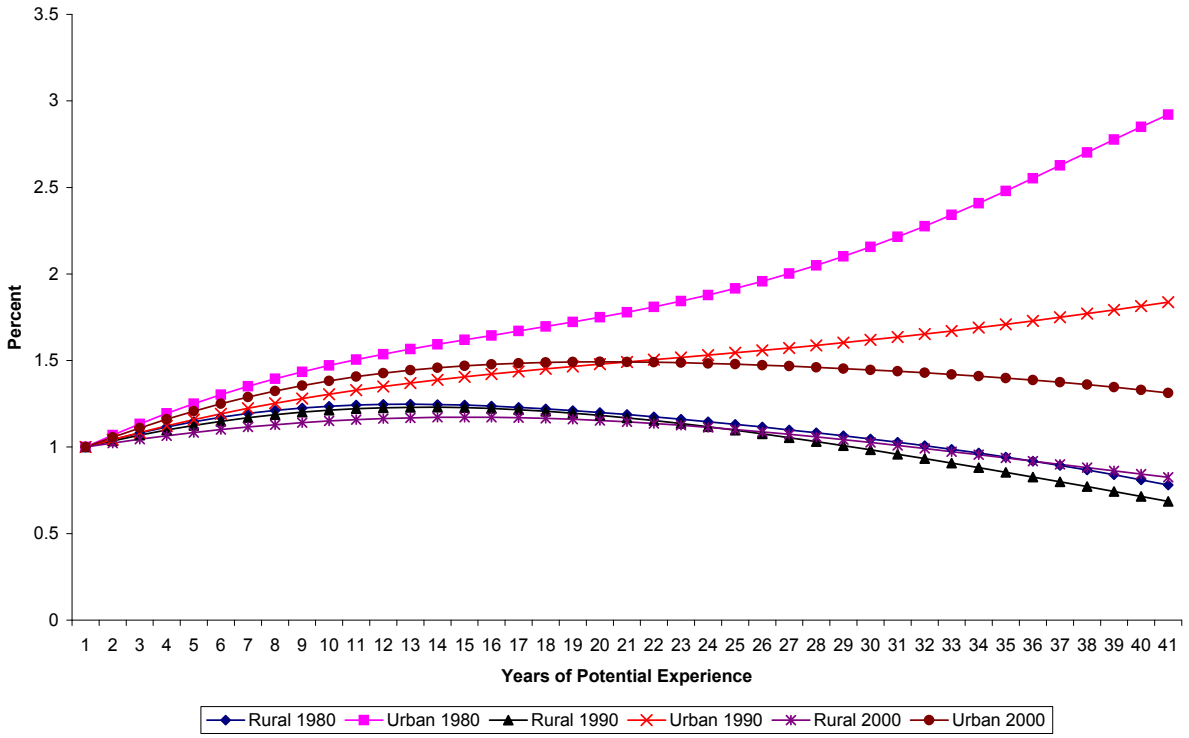


Figure 13: Returns to Experience among Women in Urban and Rural America



In Tables 7a-7c (pages 36-38) we present estimates of equation 1 for men and women living in urban and rural areas within Appalachia. Here a much different picture emerges. Similar to the entire U.S. we see that the returns to skill rose in both rural and urban areas in Appalachia over the 1980s, but that the returns to skill were flat or even fell over the 1990s, even for people living in the urban areas. For example, the return to a Bachelor's Degree for men in urban areas in Appalachia fell from 0.70 to 0.69 in the 1990s. These results suggest that one reason that the returns to skill rose in the rest of the country in the 1990s while they remained stagnant in Appalachia is that the returns to skill for those living in urban areas in the rest of the country rose in the 1990s while for people living in urban areas in Appalachia the returns to skill did not change.

In Tables 8a-8c (pages 38-40) we present estimates of equation 1 for individual living in Appalachia and non-Appalachia in the Federal Reserve Fourth District. The estimates in these tables are quite similar to the estimates in Tables 3a-3c which were based on the entire country. In particular, for the Fourth District the returns to schooling both within and outside Appalachia rose in the 1980s and continued to rise in the 1990s for people living outside Appalachia, but were constant or even fell in the 1990s for people living within Appalachia. We also find that the returns to experience for men living in Appalachia dropped in the 1990s while it rose for non-Appalachian men and women in the 1990s.

In the next set of tables we present estimates for the returns to skill within and outside of Appalachia, by state, for the three states in the Fourth District that contain both Appalachian and non-Appalachian regions. In Tables 9a-9c (pages 43-45) we present results for Kentucky, in Tables 10a-10c (page 46-48) we present results for Ohio and in Tables 11a-11c (pages 49-51) we present results for Pennsylvania. In general the results for Kentucky and Ohio in these tables are similar to the results for the entire Fourth District (Tables 8a-8c) and for the entire country (Tables 3a-3c), with some notable exceptions. By 2000 the return in Kentucky and Ohio to a Masters Degree for both men and women in Appalachia exceeded the average return outside of Appalachia (this is true for a BA degree for women as well). There are also some notable differences in education returns in Pennsylvania. For men and women, both within and outside Appalachia, the return to schooling rose during the 1980s. However, for men in Appalachia in Pennsylvania to return to schooling also rose in the 1990s while for men outside Appalachia in Pennsylvania the return fell. This is in contrast to the results for the rest of the country where the return to schooling for men outside Appalachia rose over the 1990s while for men within Appalachia the returns to schooling remained constant or fell. For women in Pennsylvania the return to schooling fell both within and outside Appalachia during the 1990s, although the fall was much larger for women living outside Appalachia.

We next turn to results from a series of Oaxaca wage decompositions based on average differences in wages. We start by decomposing the wage gap between urban and rural workers. In Table 12

Table 7a: Estimated Returns to Skill for Men and Women in Appalachia 1980

	Men		Women	
	Urban	Rural	Urban	Rural
High School	0.241***	0.243***	0.194***	0.164***
	(0.007)	(0.006)	(0.008)	(0.006)
Some College	0.329***	0.300***	0.354***	0.326***
	(0.009)	(0.008)	(0.010)	(0.008)
Bachelors Degree	0.580***	0.500***	0.630***	0.672***
	(0.009)	(0.009)	(0.012)	(0.010)
Masters or more	0.677***	0.558***	0.812***	0.822***
	(0.012)	(0.013)	(0.016)	(0.016)
White, Hispanic	-0.049	-0.031	-0.063	-0.026
	(0.039)	(0.040)	(0.047)	(0.036)
Black, non-Hispanic	-0.219***	-0.272***	-0.066***	-0.094***
	(0.118)	(0.012)	(0.011)	(0.011)
Black, Hispanic	-0.131	-0.832**	0.014	-0.464*
	(0.118)	(0.268)	(0.153)	(0.233)
Other, non-Hispanic	-0.075	-0.061	-0.082*	-0.07
	(0.041)	(0.037)	(0.039)	(0.040)
Other, Hispanic	-0.211**	-0.419	-0.079	-0.382**
	(0.081)	(0.215)	(0.177)	(0.129)
Experience	0.111***	0.081***	0.057***	0.041***
	(0.005)	(0.005)	(0.007)	(0.006)
Experience squared	-0.006***	-0.004***	-0.004***	-0.002***
	(0.000)	(0.000)	(0.001)	(0.000)
Experience cubed (000's)	0.147***	0.107***	0.108***	0.069***
	(0.012)	(0.011)	(0.016)	(0.013)
Experience quartic (0000's)	-0.014***	-0.010***	-0.011***	-0.007***
	(0.001)	(0.001)	(0.002)	(0.001)
MSA	0.138***	0.047**	0.038*	0.039*
	(0.015)	(0.016)	(0.016)	(0.015)
Married	0.212***	0.248***	-0.018**	0.01
	(0.007)	(0.007)	(0.006)	(0.006)
Constant	1.408***	1.621***	1.650***	1.664***
	(0.027)	(0.026)	(0.032)	(0.026)
R-squared	0.123	0.078	0.087	0.092
Number of Observations	7.76E+04	1.08E+05	5.79E+04	7.81E+04

Table 7b: Estimated Returns to Skill for Men and Women in Appalachia in 1990

	Men		Women	
	Urban	Rural	Urban	Rural
High School	0.236***	0.246***	0.209***	0.182***
	(0.007)	(0.005)	(0.008)	(0.006)
Some College	0.377***	0.365***	0.417***	0.379***
	(0.008)	(0.006)	(0.008)	(0.006)
Bachelors Degree	0.700***	0.599***	0.712***	0.717***
	(0.009)	(0.007)	(0.010)	(0.008)
Masters or more	0.872***	0.746***	0.940***	0.959***
	(0.011)	(0.009)	(0.011)	(0.009)
White, Hispanic	-0.131***	-0.096***	-0.023	-0.003
	(0.029)	(0.028)	(0.031)	(0.027)
Black, non-Hispanic	-0.174***	-0.179***	-0.044***	-0.078***
	(0.009)	(0.008)	(0.008)	(0.007)
Black, Hispanic	-0.121	-0.079	0.228	-0.09
	(0.147)	(0.217)	(0.214)	(0.115)
Other, non-Hispanic	-0.033	-0.077**	-0.105***	-0.03
	(0.025)	(0.028)	(0.029)	(0.026)
Other, Hispanic	-0.013	0.027	-0.143	0.223
	(0.240)	(0.248)	(0.093)	(0.218)
Experience	0.041***	0.038***	0.041***	0.034***
	(0.005)	(0.005)	(0.005)	(0.005)
Experience squared	-0.001	-0.001*	-0.002***	-0.001***
	0.000	0.000	0.000	0.000
Experience cubed (000's)	-0.004	0.005	0.036**	0.024*
	(0.011)	(0.009)	(0.012)	(0.011)
Experience quartic (0000's)	0.001	0	-0.003*	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)
MSA	0.022***	-0.013	0.014*	-0.019
	(0.006)	(0.012)	(0.006)	(0.013)
Married	0.226***	0.201***	-0.006	0.007
	(0.005)	(0.004)	(0.004)	(0.004)
Constant	1.629***	1.651***	1.604***	1.562***
	(0.024)	(0.022)	(0.024)	(0.022)
R-squared	0.186	0.126	0.136	0.139
Number of Observations	9.54E+04	1.44E+05	8.36E+04	1.25E+05

Table 7c: Estimated Returns to Skill for Men and Women in Appalachia in 2000

	Men		Women	
	Urban	Rural	Urban	Rural
High School	0.206***	0.204***	0.166***	0.168***
	(0.007)	(0.005)	(0.009)	(0.007)
Some College	0.359***	0.335***	0.381***	0.366***
	(0.007)	(0.006)	(0.009)	(0.007)
Bachelors Degree	0.692***	0.592***	0.705***	0.697***
	(0.008)	(0.008)	(0.010)	(0.008)
Masters or more	0.871***	0.781***	0.909***	0.951***
	(0.010)	(0.010)	(0.010)	(0.009)
White, Hispanic	-0.157***	-0.127***	-0.058**	0.022
	(0.017)	(0.019)	(0.022)	(0.028)
Black, non-Hispanic	-0.125***	-0.107***	-0.015*	-0.017*
	(0.007)	(0.008)	(0.006)	(0.007)
Black, Hispanic	-0.289***	-0.165	0.065	0.089
	(0.083)	(0.107)	(0.088)	(0.090)
Other, non-Hispanic	-0.111***	-0.042*	-0.051***	-0.004
	(0.014)	(0.017)	(0.015)	(0.017)
Other, Hispanic	-0.193***	-0.172***	-0.038	0.02
	(0.018)	(0.019)	(0.025)	(0.028)
Experience	0.068***	0.053***	0.041***	0.031***
	(0.005)	(0.005)	(0.005)	(0.005)
Experience squared	-0.003***	-0.002***	-0.002***	-0.001**
	0.000	0.000	0.000	0.000
Experience cubed (000's)	0.058***	0.053***	0.030*	0.026*
	(0.011)	(0.010)	(0.012)	(0.012)
Experience quartic (0000's)	-0.005***	-0.005***	-0.002	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)
MSA	0.043***	-0.011	0.051***	-0.036***
	(0.006)	(0.009)	(0.006)	(0.010)
Married	0.212***	0.166***	0.019***	0.025***
	(0.004)	(0.004)	(0.004)	(0.004)
Constant	1.611***	1.733***	1.655***	1.657***
	(0.023)	(0.023)	(0.022)	(0.023)
R-squared	0.189	0.130	0.150	0.151
Number of Observations	1.24E+05	1.38E+05	1.13E+05	1.25E+05

Table 8a: Estimated Returns to Skill for Men and Women in 1980 in the 4th district

	Men		Women	
	Appalachia	Non-Appalachia	Appalachia	Non-Appalachia
High School	0.207***	0.195***	0.199***	0.168***
	(0.008)	(0.006)	(0.011)	(0.008)
Some College	0.278***	0.271***	0.400***	0.314***
	(0.011)	(0.008)	(0.014)	(0.010)
Bachelors Degree	0.465***	0.474***	0.698***	0.573***
	(0.011)	(0.008)	(0.016)	(0.011)
Masters or more	0.527***	0.539***	0.864***	0.720***
	(0.016)	(0.011)	(0.021)	(0.016)
White, Hispanic	-0.059	-0.026	-0.142	-0.005
	(0.051)	(0.026)	(0.074)	(0.032)
Black, non-Hispanic	-0.152***	-0.096***	0.031	0.029**
	(0.021)	(0.010)	(0.018)	(0.010)
Black, Hispanic	0.273	-0.085	0.274	0.022
	(0.390)	(0.135)	(0.263)	(0.137)
Other, non-Hispanic	-0.104	-0.065*	0.011	-0.085**
	(0.057)	(0.025)	(0.053)	(0.032)
Other, Hispanic	-0.202	0.05	-0.393*	0.082
	(0.316)	(0.108)	(0.185)	(0.089)
Experience	0.104***	0.080***	0.046***	0.054***
	(0.008)	(0.005)	(0.009)	(0.006)
Experience squared	-0.006***	-0.003***	-0.003***	-0.004***
	(0.001)	0.000	(0.001)	0.000
Experience cubed (000's)	0.151***	0.065***	0.088***	0.101***
	(0.019)	(0.012)	(0.021)	(0.015)
Experience quartic (0000's)	-0.014***	-0.005***	-0.009***	-0.010***
	(0.002)	(0.001)	(0.002)	(0.002)
MSA	0.133***	0.113***	0.093***	0.070***
	(0.006)	(0.006)	(0.007)	(0.007)
Married	0.247***	0.225***	-0.031***	-0.033***
	(0.009)	(0.006)	(0.008)	(0.006)
Constant	1.620***	1.676***	1.654***	1.711***
	(0.034)	(0.023)	(0.038)	(0.028)
R-squared	0.091	0.106	0.103	0.069
Number of Observations	5.69E+04	1.11E+05	3.70E+04	8.06E+04

Table 8b: Estimated Returns to Skill for Men and Women in 1900 in the 4th district

	Men		Women	
	Appalachia	Non-Appalachia	Appalachia	Non-Appalachia
High School	0.261***	0.217***	0.199***	0.184***
	(0.009)	(0.007)	(0.012)	(0.008)
Some College	0.392***	0.331***	0.423***	0.389***
	(0.010)	(0.008)	(0.012)	(0.009)
Bachelors Degree	0.671***	0.620***	0.763***	0.677***
	(0.012)	(0.009)	(0.014)	(0.010)
Masters or more	0.841***	0.774***	0.993***	0.912***
	(0.014)	(0.010)	(0.016)	(0.012)
White, Hispanic	-0.052	-0.02	-0.09	0.01
	(0.051)	(0.019)	(0.048)	(0.023)
Black, non-Hispanic	-0.103***	-0.146***	0.050**	0.023**
	(0.021)	(0.009)	(0.018)	(0.008)
Black, Hispanic	-0.426**	-0.548*	0.143	0.053
	(0.154)	(0.272)	(0.115)	(0.075)
Other, non-Hispanic	-0.037	-0.082***	-0.042	-0.109***
	(0.049)	(0.022)	(0.042)	(0.025)
Other, Hispanic	0.298	-0.07	-0.09	0.523***
	(0.157)	(0.108)	(0.114)	(0.146)
Experience	0.041***	0.049***	0.042***	0.047***
	(0.007)	(0.005)	(0.007)	(0.005)
Experience squared	-0.001	-0.001**	-0.002***	-0.002***
	(0.001)	0.000	(0.001)	0.000
Experience cubed (000's)	-0.004	0.01	0.041*	0.048***
	(0.015)	(0.012)	(0.018)	(0.012)
Experience quartic (0000's)	0.001	-0.001	-0.003	-0.004**
	(0.002)	(0.001)	(0.002)	(0.001)
MSA	0.084***	0.090***	0.102***	0.083***
	(0.005)	(0.005)	(0.006)	(0.005)
Married	0.233***	0.232***	-0.018**	-0.022***
	(0.007)	(0.005)	(0.006)	(0.004)
Constant	1.552***	1.617***	1.496***	1.589***
	(0.032)	(0.023)	(0.033)	(0.024)
R-squared	0.154	0.185	0.150	0.130
Number of Observations	6.56E+04	1.15E+05	5.37E+04	1.02E+05

Table 8c: Estimated Returns to Skill for Men and Women in 2000 in the 4th district

	Men		Women	
	Appalachia	Non-Appalachia	Appalachia	Non-Appalachia
High School	0.251***	0.234***	0.177***	0.200***
	(0.010)	(0.008)	(0.012)	(0.009)
Some College	0.381***	0.369***	0.405***	0.393***
	(0.010)	(0.008)	(0.012)	(0.009)
Bachelors Degree	0.679***	0.677***	0.741***	0.699***
	(0.012)	(0.009)	(0.014)	(0.010)
Masters or more	0.880***	0.845***	0.990***	0.909***
	(0.015)	(0.011)	(0.015)	(0.011)
White, Hispanic	-0.007	-0.088***	0.033	-0.033
	(0.041)	(0.023)	(0.052)	(0.022)
Black, non-Hispanic	-0.134***	-0.152***	0.029	0.002
	(0.016)	(0.007)	(0.016)	(0.007)
Black, Hispanic	-0.29	-0.192*	0.417	0.027
	(0.263)	(0.092)	(0.248)	(0.059)
Other, non-Hispanic	-0.056*	-0.089***	0.029	-0.087***
	(0.025)	(0.014)	(0.026)	(0.015)
Other, Hispanic	-0.114*	-0.158***	0.028	-0.058**
	(0.050)	(0.020)	(0.062)	(0.021)
Experience	0.048***	0.075***	0.032***	0.050***
	(0.007)	(0.006)	(0.007)	(0.005)
Experience squared	-0.002**	-0.003***	-0.001	-0.002***
	(0.001)	0.000	(0.001)	0.000
Experience cubed (000's)	0.033*	0.078***	0.016	0.047***
	(0.016)	(0.014)	(0.019)	(0.013)
Experience quartic (0000's)	-0.003	-0.007***	-0.001	-0.004**
	(0.002)	(0.001)	(0.002)	(0.001)
MSA	0.089***	0.061***	0.106***	0.072***
	(0.005)	(0.004)	(0.005)	(0.005)
Married	0.209***	0.211***	0.020***	0.023***
	(0.005)	(0.004)	(0.005)	(0.004)
Constant	1.636***	1.645***	1.587***	1.649***
	(0.033)	(0.025)	(0.032)	(0.023)
R-squared	0.169	0.175	0.173	0.144
Number of Observations	6.80E+04	1.26E+05	6.10E+04	1.18E+05

(page 50) we present results using workers in the entire U.S. while in Table 13 (page 51) we focus on workers in states that are part of the Appalachian region.

The results in Table 12 show that, while the urban/rural wage gap has remained fairly constant over time, the percent of the gap that is due to skill differentials between urban and rural workers has risen between 1980 and 2000 while the percent of the wage gap due to differences in returns has fallen over this period. In Table 13 (page 51) we see the exact opposite pattern within Appalachia. Within Appalachia, the percent of the urban/rural wage gap that is due to differences in skills falls between 1980 and 2000 while the percentage of the difference due to differences in returns rises.

In Table 14 (page 52) we present results from decomposing the Appalachian non-Appalachian wage differential for people who live in the Federal Reserve Fourth District. The results in Table 13 closely mirror the results in Table 4 which were based on the entire country. Within the Fourth District the Appalachian/non-Appalachian wage gap has risen between 1980 and 2000 while the percent of the age gap due to differences is school has fallen and the percent due differences in returns has risen.

The evidence presented here is fairly robust in that over the past two decades skill upgrading has occurred such that much of the interregional wage gap in 2000 is explained by differences in returns to skill. The outlier is the urban-rural decomposition of men where the evidence points to a rising skill gap. This is puzzling because the pattern for the returns to schooling and experience between urban and rural areas largely mimics the pattern observed in Appalachia versus Non-Appalachia. The answer to the puzzle, however, can be found in the simple summary statistics presented in Table 15 (page 53) that are used in the Oaxaca decompositions. Unlike Table 1 where we saw skill upgrading in Appalachia relative to Non-Appalachia, there is no comparable evidence of catch-up in educational attainment (at least at the BA degree and above) in rural America between 1980 and 2000, and thus even though there is a widening gap in skill returns in rural versus urban area, the skill gap has widened even faster leading to the result of higher skill gaps explaining the urban-rural wage gap.

VIII. Conclusion

Our results indicate men and women in Appalachia significantly upgraded their human capital in terms of education attainment compared to men and women in the rest of the nation. This relative skill upgrading prevented the wages of Appalachians from falling further behind those outside the region during the period of widening inequality overall. As a consequence, the wage distribution in Appalachia compared to non-Appalachia is less due to skill shortfalls than to differences in skill returns. The latter of which appears to be driven in large part to the decline in the returns to experience among men in Appalachia over the past two decades.

At the same time, however, for men we find that skill shortages remain more pronounced at the high end of the wage

distribution (and in rural America in general), which is borne out in the summary statistics in Tables 1 and 15 that show that college completion and advanced degrees in Appalachia (and rural areas) are about one-half the rate of attainment in the rest of the country. To bring Appalachia more in parity with the rest of the nation more of her residents need to complete post-baccalaureate degree programs—a supply-side issue—but because skill returns differ policy must also focus on the demand-side issue of developing high skill jobs that encourage higher-educated Appalachians to remain in the region rather that migrate to higher returns in other areas of the United States.

Table 9a: Estimated Returns to Skill for Men and Women in 1980 in Kentucky

	Men		Women	
	Appalachia	Non-Appalachia	Appalachia	Non-Appalachia
High School	0.228***	0.277***	0.193***	0.195***
	(0.022)	(0.021)	(0.027)	(0.024)
Some College	0.304***	0.380***	0.407***	0.348***
	(0.029)	(0.028)	(0.035)	(0.030)
Bachelors Degree	0.431***	0.565***	0.853***	0.643***
	(0.034)	(0.033)	(0.038)	(0.035)
Masters or more	0.493***	0.620***	0.989***	0.819***
	(0.059)	(0.034)	(0.060)	(0.048)
White, Hispanic	-0.027	-0.079	0.127	0.006
	(0.132)	(0.177)	(0.176)	(0.097)
Black, non-Hispanic	-0.156*	-0.259***	-0.02	-0.109*
	(0.066)	(0.047)	(0.054)	(0.045)
Black, Hispanic	-0.888*	-1.335***	0	0
	(0.349)	(0.023)	0.000	0.000
Other, non-Hispanic	0.11	0.043	0.045	-0.391***
	(0.135)	(0.133)	(0.112)	(0.085)
Other, Hispanic	0	-0.200***	0	-1.107***
	0.000	(0.024)	0.000	(0.023)
Experience	0.085***	0.087***	0.023	0.044*
	(0.022)	(0.018)	(0.022)	(0.019)
Experience squared	-0.005**	-0.004**	-0.001	-0.002
	(0.002)	(0.001)	(0.002)	(0.001)
Experience cubed (000's)	0.142**	0.067	0.028	0.04
	(0.047)	(0.040)	(0.052)	(0.046)
Experience quartic (0000's)	-0.014**	-0.005	-0.003	-0.004
	(0.005)	(0.004)	(0.005)	(0.005)
MSA	0	0.052**	0	0.033
	0.000	(0.017)	0.000	(0.018)
Married	0.299***	0.229***	-0.048	-0.038
	(0.028)	(0.025)	(0.026)	(0.020)
Constant	1.665***	1.510***	1.696***	1.641***
	(0.100)	(0.081)	(0.098)	(0.082)
R-squared	0.052	0.106	0.129	0.097
Number of Observations	8.23E+03	9.61E+03	5.32E+03	7.34E+03

Table 9b: Estimated Returns to Skill for Men and Women in 1990 in Kentucky

	Men		Women	
	Appalachia	Non-Appalachia	Appalachia	Non-Appalachia
High School	0.273***	0.275***	0.190***	0.245***
	(0.020)	(0.022)	(0.023)	(0.028)
Some College	0.438***	0.433***	0.385***	0.470***
	(0.023)	(0.025)	(0.026)	(0.029)
Bachelors Degree	0.640***	0.700***	0.787***	0.708***
	(0.034)	(0.028)	(0.037)	(0.036)
Masters or more	0.764***	0.809***	1.077***	0.889***
	(0.036)	(0.034)	(0.033)	(0.039)
White, Hispanic	0.033	-0.083	-0.11	-0.089
	(0.155)	(0.108)	(0.135)	(0.177)
Black, non-Hispanic	-0.132*	-0.250***	0.026	-0.101*
	(0.065)	(0.046)	(0.053)	(0.041)
Black, Hispanic	0	-2.064***	-0.558***	-0.587*
	0.000	(0.021)	(0.022)	(0.244)
Other, non-Hispanic	-0.275*	0.001	-0.018	-0.065
	(0.109)	(0.095)	(0.158)	(0.149)
Other, Hispanic	0.629	0.492	0.327***	0.985***
	(0.669)	(0.930)	(0.027)	(0.030)
Experience	0.046*	0.077***	0.051**	0.016
	(0.019)	(0.016)	(0.018)	(0.017)
Experience squared	-0.001	-0.004**	-0.002	0
	(0.001)	(0.001)	(0.001)	(0.001)
Experience cubed (000's)	0.008	0.088*	0.049	-0.027
	(0.039)	(0.035)	(0.037)	(0.038)
Experience quartic (0000's)	0	-0.008*	-0.004	0.004
	(0.004)	(0.004)	(0.004)	(0.004)
MSA	0	0.094***	0	0.065***
	0.000	(0.015)	(0.000)	(0.015)
Married	0.231***	0.200***	0.031	0.012
	(0.020)	(0.017)	(0.017)	(0.016)
Constant	1.470***	1.453***	1.329***	1.610***
	(0.095)	(0.072)	(0.088)	(0.081)
R-squared	0.114	0.172	0.18	0.128
Number of Observations	9.08E+03	1.27E+04	7.34E+03	1.13E+04

Table 9c: Estimated Returns to Skill for Men and Women in 2000 in Kentucky

	Men		Women	
	Appalachia	Non-Appalachia	Appalachia	Non-Appalachia
High School	0.235***	0.219***	0.206***	0.263***
	(0.019)	(0.025)	(0.024)	(0.027)
Some College	0.372***	0.391***	0.440***	0.449***
	(0.022)	(0.026)	(0.025)	(0.028)
Bachelors Degree	0.615***	0.716***	0.764***	0.738***
	(0.032)	(0.029)	(0.031)	(0.031)
Masters or more	0.861***	0.827***	1.083***	0.874***
	(0.035)	(0.037)	(0.030)	(0.033)
White, Hispanic	-0.089	-0.193*	0.017	-0.111
	(0.086)	(0.080)	(0.084)	(0.081)
Black, non-Hispanic	-0.007	-0.141***	0.132*	-0.018
	(0.059)	(0.035)	(0.052)	(0.030)
Black, Hispanic	0.098	0.035	-0.234***	0
	(0.619)	(0.249)	(0.026)	0.000
Other, non-Hispanic	0.12	-0.049	0.108	-0.101
	(0.077)	(0.056)	(0.081)	(0.060)
Other, Hispanic	-0.126	-0.350***	-0.436*	-0.145
	(0.097)	(0.093)	(0.206)	(0.090)
Experience	0.048*	0.093***	0.02	0.038*
	(0.019)	(0.017)	(0.021)	(0.017)
Experience squared	-0.002	-0.004***	0	-0.001
	(0.001)	(0.001)	(0.002)	(0.001)
Experience cubed (000's)	0.04	0.098*	-0.006	0.023
	(0.038)	(0.040)	(0.052)	(0.044)
Experience quartic (0000's)	-0.004	-0.008	0.002	-0.001
	(0.004)	(0.004)	(0.006)	(0.005)
MSA	0	0.012	0	0.060***
	0.000	(0.013)	(0.000)	(0.012)
Married	0.166***	0.196***	0.045**	0.041**
	(0.016)	(0.015)	(0.014)	(0.013)
Constant	1.619***	1.552***	1.548***	1.658***
	(0.091)	(0.079)	(0.095)	(0.076)
R-squared	0.127	0.173	0.185	0.146
Number of Observations	9.41E+03	1.46E+04	8.60E+03	1.36E+04

Table 10a: Estimated Returns to Skill for Men and Women in 1980 in Ohio

	Men		Women	
	Appalachia	Non-Appalachia	Appalachia	Non-Appalachia
High School	0.200***	0.184***	0.170***	0.164***
	(0.017)	(0.007)	(0.023)	(0.008)
Some College	0.236***	0.259***	0.346***	0.310***
	(0.023)	(0.008)	(0.029)	(0.010)
Bachelors Degree	0.417***	0.464***	0.719***	0.567***
	(0.024)	(0.009)	(0.034)	(0.012)
Masters or more	0.415***	0.531***	0.797***	0.711***
	(0.039)	(0.011)	(0.057)	(0.017)
White, Hispanic	-0.12	-0.031	-0.037	-0.007
	(0.123)	(0.026)	(0.165)	(0.033)
Black, non-Hispanic	-0.005	-0.090***	0.097	0.035***
	(0.049)	(0.010)	(0.066)	(0.010)
Black, Hispanic	0	-0.084	0	0.019
	0.000	(0.136)	0.000	(0.137)
Other, non-Hispanic	-0.067	-0.072**	0.358*	-0.064
	(0.175)	(0.026)	(0.153)	(0.033)
Other, Hispanic	0.685**	0.049	-0.674***	0.119
	(0.260)	(0.111)	(0.201)	(0.083)
Experience	0.076***	0.078***	0.046*	0.055***
	(0.021)	(0.005)	(0.019)	(0.006)
Experience squared	-0.004*	-0.003***	-0.002	-0.004***
	(0.002)	0.000	(0.001)	(0.001)
Experience cubed (000's)	0.095	0.062***	0.054	0.105***
	(0.051)	(0.012)	(0.044)	(0.016)
Experience quartic (0000's)	-0.009	-0.005***	-0.005	-0.011***
	(0.005)	(0.001)	(0.005)	(0.002)
MSA	0.078***	0.102***	0.118***	0.069***
	(0.016)	(0.007)	(0.019)	(0.008)
Married	0.218***	0.224***	-0.004	-0.033***
	(0.020)	(0.007)	(0.018)	(0.006)
Constant	1.810***	1.709***	1.619***	1.721***
	(0.087)	(0.024)	(0.083)	(0.029)
R-squared	0.055	0.104	0.087	0.066
Number of Observations	1.25E+04	8.63E+04	8.03E+03	6.29E+04

Table 10b: Estimated Returns to Skill for Men and Women in 1990 in Ohio

	Men		Women	
	Appalachia	Non-Appalachia	Appalachia	Non-Appalachia
High School	0.265***	0.206***	0.165***	0.177***
	(0.017)	(0.007)	(0.022)	(0.009)
Some College	0.347***	0.318***	0.340***	0.380***
	(0.020)	(0.008)	(0.024)	(0.009)
Bachelors Degree	0.591***	0.609***	0.725***	0.672***
	(0.024)	(0.009)	(0.029)	(0.010)
Masters or more	0.733***	0.767***	0.994***	0.915***
	(0.030)	(0.011)	(0.032)	(0.012)
White, Hispanic	0.076	-0.022	-0.029	0.012
	(0.073)	(0.019)	(0.087)	(0.023)
Black, non-Hispanic	-0.176**	-0.142***	0.103	0.028***
	(0.068)	(0.009)	(0.055)	(0.008)
Black, Hispanic	0	-0.486	0.189***	0.109
	0.000	(0.276)	(0.017)	(0.070)
Other, non-Hispanic	0.126	-0.088***	-0.031	-0.112***
	(0.099)	(0.023)	(0.097)	(0.025)
Other, Hispanic	0.395*	-0.11	-0.546***	0.490**
	(0.183)	(0.093)	(0.017)	(0.152)
Experience	0.037*	0.046***	0.029	0.049***
	(0.017)	(0.005)	(0.015)	(0.005)
Experience squared	-0.001	-0.001	-0.001	-0.002***
	(0.001)	0.000	(0.001)	0.000
Experience cubed (000's)	0	0.003	0.009	0.054***
	(0.036)	(0.013)	(0.033)	(0.013)
Experience quartic (0000's)	0	0	0	-0.004***
	(0.004)	(0.001)	(0.003)	(0.001)
MSA	0.165***	0.078***	0.166***	0.079***
	(0.015)	(0.005)	(0.018)	(0.005)
Married	0.232***	0.234***	-0.025	-0.025***
	(0.015)	(0.005)	(0.013)	(0.005)
Constant	1.610***	1.650***	1.602***	1.593***
	(0.079)	(0.024)	(0.069)	(0.025)
R-squared	0.125	0.186	0.119	0.130
Number of Observations	1.60E+04	9.34E+04	1.31E+04	8.29E+04

Table 10c: Estimated Returns to Skill for Men and Women in 2000 in Ohio

	Men		Women	
	Appalachia	Non-Appalachia	Appalachia	Non-Appalachia
High School	0.252***	0.233***	0.188***	0.194***
	(0.019)	(0.009)	(0.020)	(0.010)
Some College	0.353***	0.365***	0.400***	0.387***
	(0.020)	(0.009)	(0.021)	(0.010)
Bachelors Degree	0.617***	0.672***	0.730***	0.694***
	(0.024)	(0.010)	(0.025)	(0.011)
Masters or more	0.778***	0.845***	1.007***	0.912***
	(0.031)	(0.012)	(0.027)	(0.012)
White, Hispanic	-0.082	-0.075**	0.283	-0.028
	(0.088)	(0.024)	(0.177)	(0.023)
Black, non-Hispanic	-0.176***	-0.154***	0.001	0.002
	(0.045)	(0.008)	(0.041)	(0.007)
Black, Hispanic	-0.390***	-0.208*	0.148***	0.026
	(0.015)	(0.097)	(0.016)	(0.059)
Other, non-Hispanic	-0.154***	-0.093***	0.046	-0.086***
	(0.045)	(0.014)	(0.047)	(0.015)
Other, Hispanic	-0.013	-0.143***	0.059	-0.053*
	(0.083)	(0.021)	(0.118)	(0.021)
Experience	0.035*	0.073***	0.038**	0.051***
	(0.016)	(0.006)	(0.013)	(0.005)
Experience squared	-0.001	-0.003***	-0.002	-0.002***
	(0.001)	0.000	(0.001)	0.000
Experience cubed (000's)	0.012	0.074***	0.039	0.049***
	(0.037)	(0.015)	(0.029)	(0.013)
Experience quartic (0000's)	-0.001	-0.006***	-0.004	-0.004**
	(0.004)	(0.002)	(0.003)	(0.001)
MSA	0.109***	0.063***	0.095***	0.074***
	(0.010)	(0.005)	(0.011)	(0.005)
Married	0.208***	0.212***	0.023*	0.021***
	(0.011)	(0.004)	(0.010)	(0.004)
Constant	1.761***	1.660***	1.603***	1.647***
	(0.071)	(0.026)	(0.060)	(0.024)
R-squared	0.135	0.175	0.152	0.144
Number of Observations	1.81E+04	1.07E+05	1.60E+04	1.00E+05

Table 11a: Estimated Returns to Skill for Men and Women in 1980 in Pennsylvania

	Men		Women	
	Appalachia	Non-Appalachia	Appalachia	Non-Appalachia
High School	0.154***	0.177***	0.190***	0.217***
	(0.011)	(0.028)	(0.015)	(0.029)
Some College	0.240***	0.259***	0.395***	0.414***
	(0.014)	(0.034)	(0.018)	(0.034)
Bachelors Degree	0.445***	0.504***	0.643***	0.687***
	(0.014)	(0.031)	(0.022)	(0.036)
Masters or more	0.522***	0.597***	0.834***	0.871***
	(0.020)	(0.041)	(0.026)	(0.041)
White, Hispanic	-0.033	-0.104	-0.278*	-0.599
	(0.064)	(0.090)	(0.109)	(0.432)
Black, non-Hispanic	-0.167***	-0.097***	0.028	0.018
	(0.023)	(0.028)	(0.020)	(0.028)
Black, Hispanic	0.659	0.343	0.259	0.223
	(0.397)	(0.178)	(0.263)	(0.295)
Other, non-Hispanic	-0.150*	-0.081	-0.096	-0.113
	(0.065)	(0.061)	(0.059)	(0.075)
Other, Hispanic	-0.466	-0.204	-0.033	0.154
	(0.365)	(0.225)	(0.193)	(0.102)
Experience	0.109***	0.146***	0.048***	0.026
	(0.010)	(0.020)	(0.012)	(0.017)
Experience squared	-0.006***	-0.009***	-0.003***	-0.001
	(0.001)	(0.002)	(0.001)	(0.001)
Experience cubed (000's)	0.145***	0.224***	0.101**	0.05
	(0.027)	(0.058)	(0.031)	(0.042)
Experience quartic (0000's)	-0.013***	-0.021**	-0.011**	-0.006
	(0.003)	(0.006)	(0.003)	(0.004)
MSA	0.115***	0.135***	0.073***	0.031
	(0.008)	(0.023)	(0.010)	(0.024)
Married	0.246***	0.217***	-0.040***	-0.068***
	(0.011)	(0.022)	(0.010)	(0.017)
Constant	1.623***	1.446***	1.703***	1.803***
	(0.043)	(0.078)	(0.051)	(0.078)
R-squared	0.102	0.121	0.092	0.109
Number of Observations	3.30E+04	1.18E+04	2.16E+04	8.42E+03

Table 12: Oaxaca-Blinder Decomposition of Average Wage Gaps between Urban and Rural Workers for all US workers

Men, Urban as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.216	0.066	31%	0.150	69%
		(0.002)		0.003	
1990	0.255	0.060	24%	0.195	76%
		(0.002)		(0.002)	
2000	0.222	0.099	45%	0.123	55%
		(0.002)		(0.002)	

Men, Rural as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.216	0.097	45%	0.119	55%
		(0.005)		(0.005)	
1990	0.255	0.094	37%	0.161	63%
		0.008		(0.008)	
2000	0.222	0.097	44%	0.125	56%
		(0.003)		(0.003)	

Women, Urban as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.201	0.091	45%	0.110	55%
		(0.003)		(0.003)	
1990	0.286	0.096	34%	0.189	66%
		(0.002)		(0.002)	
2000	0.258	0.130	50%	0.128	50%
		(0.002)		(0.002)	

Women, Rural as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.201	0.080	40%	0.121	60%
		(0.005)		(0.006)	
1990	0.286	0.102	36%	0.183	64%
		(0.008)		(0.008)	
2000	0.258	0.098	38%	0.160	62%
		(0.004)		(0.004)	

Note: Standard Errors are provided in parentheses

Table 13: Oaxaca-Blinder Decomposition of Average Wage Gaps between Urban and Rural Workers in Appalachia

Men, Urban as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.157	0.173	110%	-0.015	-10%
		(0.015)		0.015	
1990	0.136	0.067	49%	0.069	51%
		(0.005)		(0.005)	
2000	0.145	0.093	64%	0.052	36%
		(0.005)		(0.005)	

Men, Rural as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.157	0.077	49%	0.080	51%
		(0.015)		(0.015)	
1990	0.136	0.029	21%	0.107	79%
		0.010		(0.011)	
2000	0.145	0.039	27%	0.106	73%
		(0.007)		(0.008)	

Women, Urban as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.109	0.072	66%	0.037	34%
		(0.015)		(0.015)	
1990	0.129	0.054	42%	0.075	58%
		(0.005)		(0.005)	
2000	0.144	0.090	63%	0.054	38%
		(0.005)		(0.006)	

Women, Rural as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.109	0.070	64%	0.039	36%
		(0.015)		(0.015)	
1990	0.129	0.025	19%	0.104	81%
		(0.011)		(0.011)	
2000	0.144	0.015	10%	0.129	90%
		(0.008)		(0.009)	

Note: Standard Errors are provided in parentheses

Table 14: Oaxaca-Blinder Decomposition of Average Wage Gaps between Appalachian and Non-Appalachian Workers in the Fourth Federal Reserve District

Men, Non-Appalachian as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.041	0.047	115%	-0.006	-15%
		(0.003)		(0.004)	
1990	0.115	0.040	35%	0.075	65%
		(0.002)		0.003	
2000	0.131	0.036	27%	0.095	73%
		(0.002)		(0.003)	

Men, Appalachian as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.041	0.051	124%	-0.010	-24%
		(0.003)		(0.004)	
1990	0.115	0.043	37%	0.072	63%
		0.002		(0.004)	
2000	0.131	0.047	36%	0.084	64%
		(0.002)		(0.004)	

Women, Non-Appalachian as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.067	0.035	52%	0.032	48%
		(0.003)		(0.005)	
1990	0.119	0.048	40%	0.071	60%
		(0.002)		(0.004)	
2000	0.138	0.041	30%	0.097	70%
		(0.002)		(0.003)	

Women, Appalachian as reference

Year	Actual Difference (log points)	Skills Gap	Percent Due to Skills Gap	Returns Gap	Percent Due to Returns Gap
1980	0.067	0.046	69%	0.021	31%
		(0.003)		(0.005)	
1990	0.119	0.058	49%	0.061	51%
		(0.003)		(0.004)	
2000	0.138	0.060	43%	0.079	57%
		(0.002)		(0.004)	

Note: Standard Errors are provided in parentheses

Table 15: Summary Statistics of Men and Women in Urban and Rural Areas, 1980-2000

	1980				1990				2000			
	Urban		Rural		Urban		Rural		Urban		Rural	
	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
Men												
Log of Real Hourly Wage	2.815	0.719	2.600	0.762	2.797	0.713	2.542	0.710	2.849	0.743	2.627	0.676
Less than high school	0.199	0.399	0.280	0.449	0.119	0.324	0.168	0.374	0.107	0.309	0.125	0.330
High School	0.326	0.469	0.391	0.488	0.293	0.455	0.414	0.492	0.284	0.451	0.416	0.493
Some College	0.202	0.402	0.158	0.365	0.289	0.453	0.250	0.433	0.294	0.455	0.286	0.452
Bachelors Degree	0.175	0.380	0.116	0.320	0.187	0.390	0.109	0.312	0.199	0.399	0.116	0.320
Masters or more	0.098	0.297	0.054	0.226	0.112	0.315	0.059	0.237	0.117	0.321	0.058	0.233
White, non-Hispanic	0.818	0.386	0.895	0.306	0.775	0.417	0.885	0.319	0.700	0.458	0.857	0.350
White, Hispanic	0.060	0.238	0.028	0.164	0.092	0.290	0.033	0.179	0.064	0.244	0.024	0.152
Black, non-Hispanic	0.091	0.288	0.060	0.237	0.088	0.283	0.061	0.239	0.097	0.296	0.061	0.240
Black, Hispanic	0.001	0.036	0.001	0.024	0.002	0.045	0.000	0.018	0.002	0.044	0.000	0.022
Other, non-Hispanic	0.026	0.159	0.015	0.122	0.041	0.198	0.020	0.139	0.068	0.252	0.033	0.178
Other, Hispanic	0.004	0.062	0.001	0.039	0.001	0.038	0.001	0.026	0.070	0.255	0.025	0.157
Potential Experience	20.540	11.455	21.344	11.531	19.930	10.210	21.211	10.263	21.297	9.856	22.726	9.818
Live in a MSA	0.947	0.225	0.035	0.183	0.931	0.253	0.008	0.088	0.953	0.211	0.041	0.197
Currently Married	0.772	0.420	0.838	0.368	0.700	0.458	0.768	0.422	0.668	0.471	0.717	0.450
Women												
Log of Real Hourly Wage	2.352	0.697	2.150	0.700	2.457	0.669	2.171	0.664	2.600	0.691	2.342	0.645
Less than high school	0.174	0.379	0.239	0.426	0.094	0.291	0.128	0.334	0.075	0.264	0.082	0.274
High School	0.418	0.493	0.453	0.498	0.325	0.468	0.425	0.494	0.276	0.447	0.379	0.485
Some College	0.205	0.403	0.163	0.370	0.321	0.467	0.284	0.451	0.335	0.472	0.342	0.474
Bachelors Degree	0.148	0.355	0.115	0.319	0.174	0.379	0.110	0.313	0.204	0.403	0.133	0.339
Masters or more	0.056	0.230	0.029	0.168	0.087	0.281	0.053	0.224	0.109	0.312	0.065	0.246
White, non-Hispanic	0.792	0.406	0.882	0.322	0.763	0.425	0.876	0.329	0.693	0.461	0.854	0.353
White, Hispanic	0.054	0.225	0.023	0.149	0.078	0.268	0.026	0.160	0.053	0.225	0.019	0.136
Black, non-Hispanic	0.120	0.325	0.076	0.265	0.114	0.318	0.075	0.264	0.128	0.334	0.073	0.261
Black, Hispanic	0.001	0.038	0.001	0.026	0.002	0.045	0.000	0.016	0.002	0.046	0.000	0.020
Other, non-Hispanic	0.029	0.167	0.017	0.128	0.042	0.200	0.021	0.144	0.068	0.251	0.035	0.185
Other, Hispanic	0.004	0.060	0.001	0.037	0.002	0.040	0.001	0.025	0.055	0.228	0.018	0.131
Potential Experience	20.425	11.321	21.314	11.244	19.916	10.219	20.959	10.137	21.310	10.013	22.488	9.782
Live in a MSA	0.948	0.221	0.035	0.183	0.932	0.251	0.008	0.087	0.954	0.209	0.040	0.195
Currently Married	0.656	0.475	0.755	0.430	0.633	0.482	0.726	0.446	0.606	0.489	0.693	0.461

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The University of Kentucky Center for Poverty Research (UKCPR) was established in October 2002 as one of three federally designated Area Poverty Research Centers, with core funding from the Office of the Assistant Secretary for Planning and Evaluation (ASPE) in the U.S. Department of Health and Human Services. The UKCPR is a nonprofit and nonpartisan academic research center housed in the Gatton College of Business & Economics, Department of Economics at the University of Kentucky. The opinions and conclusions in this brief do not necessarily represent those of the federal government or the University of Kentucky.

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