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

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Christopher Bollinger, Kenneth Troske, and James Ziliak, all professors at the University of Kentucky and the last a visiting scholar at the Federal Reserve Bank of Cleveland, have contributed to our understanding of poverty at a regional scale through a recent technical report titled "Understanding Earnings Inequality in Appalachia: Skill Upgrading versus Rising Returns to Skill." The report presents a rigorous analysis of wage differences between Appalachia and the non-Appalachia region (the remainder of the United States). Appalachia is a sprawling 205,000-square mile swath of land centered along the Appalachian Mountain from southern New York to northern Mississippi. It includes all of West Virginia and parts of 12 other states: Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia. Over 23 million people are spread across the region's 420 counties; 42 percent of the population is rural, compared with 20 percent of the national population.

Using the Integrated Public Use Micro Samples of the 1980, 1990, and 2000 decennial censuses and the standard Oaxaca (1973) and Blinder (1973) approach, the authors conduct several counterfactual wage decompositions to analyze the average wage gap between these regions over time. Their primary research questions are 1) how much of this wage differential is due to different regional average skill levels versus different regional market returns to those skills? and 2) how has this composition changed over the span of two decades? Using quantile regression and a method proposed by Machado and Mata (2005), the authors extend their analysis to consider how the wage gap and its components vary across the distribution. The motivation for the study stemmed from the fact that "inequality research…has been comparatively silent on wage differentials of workers within and between geographic regions, especially those regions known to suffer skill deficits such as the Appalachian region." Wage growth—a key correlate of poverty reduction—is an important economic indicator reflecting economic development.

The authors' wage decompositions and subsequent analysis inform public policy aimed at regional economic development. What they found is that, despite the regional trends of the past two decades highlighting the crucial importance and success of education and skill upgrading in achieving regional wage growth, a wage gap has continued to persist between the two regions even in the midst of rapid wage growth

experienced by Appalachia. Bringing the economic well-being of Appalachia more in parity with the rest of the United States is also contingent on demand-side policy initiatives. The authors argue that "more of Appalachia's 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 than move in search of higher returns elsewhere in the United States.

The interregional wage gap is an important issue to understand and address, the researchers maintain, since higher wages outside of the Appalachia region provide incentives for the emigration of its skilled workers, making it difficult for the region to build upon the gains of the past two decades, let alone maintain the progress that has been made. They conclude that higher returns to skill are necessary in order for Appalachia to encourage and retain a skilled workforce.

Trends

The Appalachian region, historically lagging behind the rest of the nation in having an educated and skilled workforce, has long been poverty's poster child. The region is perhaps most famous for the 1964 photo of Lyndon Johnson on the porch of the Fletcher family's Martin County home, taken the day that President Johnson declared a national war on poverty. The photo earned Appalachia widespread notoriety for its broken and impoverished communities. As the authors write, "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 educational attainment, and this lack of skill has perpetuated poverty in the region." This concern, the authors feel, has the potential to divert discussion that might otherwise focus on the substantial improvements Appalachia has witnessed in these areas. Specifically, the region has made significant gains in educational attainment and, as a result, has seen substantial increases in its average regional wage. In spite of tremendous progress over the past two decades, however, Appalachia still has areas of persistent poverty, including Appalachian Alabama, Kentucky, Mississippi, Tennessee, and West Virginia. As defined by the

Economic Research Society of the USDA, persistently poor areas have reported poverty rates higher than 20 percent over each of four consecutive decennial censuses.

The authors model the regional wage as a function of several variables including education, experience, gender, race, and marital status. The results provide insight into the extent to which various social, economic, and demographic variables influence the regional wage.

Increased educational attainment has been a key factor in the region's wage growth and poverty reduction. In 1980, only 57 percent of the residents in Appalachia had completed high school or more, compared to 67 percent nationally. Over the following two decades, the Appalachia region experienced greater gains in education attainment relative to the nation. In 2000, 77 percent of Appalachians obtained high school diplomas; during the same period, the national high school completion rate increased to 80 percent. Unemployment rates in the region fell from 8 percent in 1990 to 6.4 percent in 2000, nearly twice the change for the United States as a whole.

As Appalachia's educational attainment improved over two decades, so too did its market returns to education at the bachelor's- and master's-degree levels. To arrive at this finding, the authors compare average wages of different educational cohorts (high school diploma to master's level) to average wages for high school dropouts within each region from 1980–2000. Master's and bachelor's degree holders across both regions stood out in this analysis, having experienced a significant increase (roughly 10 to 20 percent increase, most of which occurred throughout the 1980s) in percentage wage gain relative to their counterparts who dropped out of high school. These findings point to a growing wage inequality within the region. Although the authors also look at increasing returns to number of years of experience, these results varied across region and gender and thus could not be generalized.

Despite evidence of a convergence in educational attainment between regions, this trend did not translate to convergence in the mean wages of the two regions. In fact, the authors show that the wage gap between Appalachia and non-Appalachia actually widened overall between 1980 and 2000 for men and women. The authors explore wider regional trends that could help to explain this pattern, with an emphasis on changing demographics in the region. During that time (1980-2000), Appalachia had experienced

an influx of low-skilled immigrants, for example, and the authors note that this "change in the composition to less skilled immigrants could possibly exacerbate regional wage differences." The authors also note large declines in marriage rates across both regions, though the decline was more pronounced in the Appalachian region.

Average Wage Comparison

Although the facts show a continued narrowing of the skills gap between the two regions, wage disparities remain; one may wonder what it actually means and why they still exist. Is there a way to determine how the wages of a resident of Appalachia with an average skill set would perform against the wages of a non-Appalachian resident? The approach these researchers use is executing a decomposition of the differences in mean outcomes in order to compare the differences in average wages between the two regions based on the Oaxaca–Blinder (1973) method. The term "decomposition" refers to the process of separation—in this case, the average wage difference between the two regions into a) the percentage due to the observable characteristics (skills gap) and b) the percentage due to the rate of return (returns gap). The skills gap is the difference in level of educational attainment between Appalachian and non-Appalachian residents. The returns gap refers to regional differences in wage compensation for persons with similar education and experience. A higher percentage due to the skills gap would indicate a need to improve education levels. Conversely, a larger returns gap would indicate a disparity in the quality of a region's available jobs.

Anatomy of a Wage Decomposition

According to the authors, a wage decomposition equation would look like this:

$$\overline{\hat{W}_{NA}} - \overline{\hat{W}_{A}} = (\overline{X}_{NA} - \overline{X}_{A})\hat{\beta}_{NA} + \overline{X}_{A}(\hat{\beta}_{NA} - \hat{\beta}_{A})$$

$\bar{W}$ Refers to the average (log) wage of either Appalachia $_{(A)}$ or non-Appalachia $_{(NA)}$

$\overline{X}$ Refers to the average skill levels of either Appalachia $_{(A)}$ or non-Appalachia $_{(NA)}$

$\hat{b}$ Refers to the regional returns to skill based on the average combination of several factors, and is calculated for both Appalachia and non-Appalachia. Education and experience are the major factors included.

The equation above can be broken down as follows:

1.) $\overline{\hat{W}_{NA}} - \overline{\hat{W}_{A}}$

Log of the average wage of non-Appalachia minus the log of the average wage of Appalachia

2.) $(\overline{X}_{NA} - \overline{X}_{A})\hat{b}_{NA}$

This part of the equation consists of the difference in average skill levels multiplied by the average return to skills in non-Appalachian region

3.) $\overline{X}_{A}(\hat{b}_{NA} - \hat{b}_{A})$

This part of the equation consists of the difference in returns multiplied by the average skill level of an Appalachian. Added to the piece of the equation described immediately above, this equals the difference in average wages based on predicted returns to the skill in a given economic environment.

The authors also use a decomposition technique in this paper based on the methodology of Machado and Mata (2005). The aim of this second procedure, according to the authors, 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." By decomposing wage differences through the entire distribution, one is able to compare outcomes for the low-wage labor force versus the high-wage labor force.

Findings

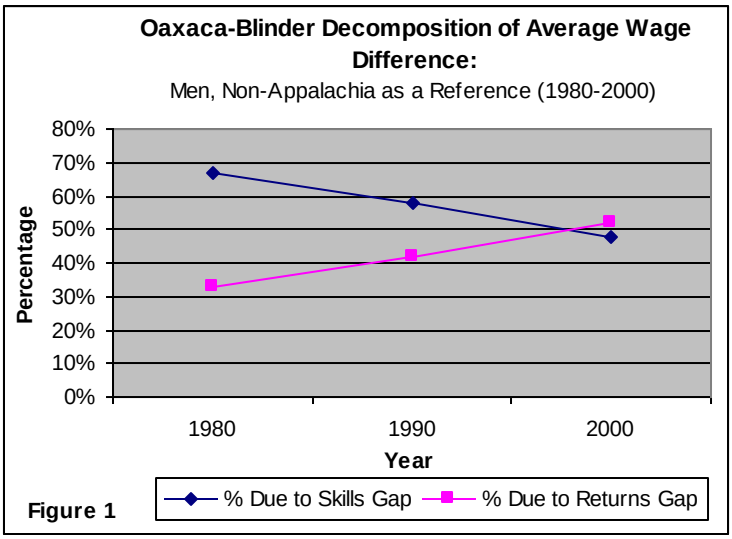

Figure 1

Figure 1 shows the equation above in action, with the decomposition corresponding to non-Appalachian men as a reference. In 1980 the main reason for the wage difference was due to skill level shortfalls (67%), but by 2000 the returns gap accounted for more than half of the wage difference (52%). How does one interpret this? The findings show that as Appalachian residents dramatically increased their educational attainment, less of the wage difference was due to lack of skills and the majority became associated with regional economic differences.

However, the Oaxaca–Blinder decomposition only allows one to see how the mean wage performs. It is unclear what occurs in the lower and upper wage categories and how the advances in education have affected the residents of Appalachia whose wages are not close to the mean.

The Machado–Mata approach can be viewed as a generalization of the previous method. It offers a look at wage decomposition over the entire wage distribution, which can illuminate differences in the wage decomposition in the higher versus lower quantiles of the wage distribution. Appalachian wages, from the lowest to the highest, were uniformly below their non-Appalachian counterparts in the 1980s. Appalachian skill level is also lower during this period, but the skills gap is wider for higher wage levels. By 2000 the skill level gap had decreased across the board, although skill upgrading took place mainly at the lower wage level. At the same time, the returns gap had increased for low-wage workers and is now the main contributor to wage differentials in the low-wage labor sector (see Figure 1). What does the Machado–Mata method add to the previous analysis? It shows that the returns gap is more important in explaining the preponderance of low-wage male workers in Appalachia, while both the skills and returns gaps are

important for explaining the lack of high-wage workers in Appalachia. In short, Appalachia seems to suffer from a problem of "missing markets" for male workers—the double jeopardy of a lack of high-skilled workers coupled with lower returns on those skills.

Conclusion

Residents of Appalachia have significantly upgraded their skills in the previous two decades, which has prevented their wages from falling further behind those outside the region. The reason for the continued gap, this paper finds, has less to do with lack of skills and more to do with regional economic returns. Both demand-side and supply-side issues must be addressed to further reduce the regional differences. For example, more Appalachian residents completing post-baccalaureate degree programs will address supply-side needs, and on the demand side, developing more high-skilled jobs will encourage higher-educated residents to remain in the region.