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Decomposing the Wage Gap: Analysis of the Income Gap Between Racial and Ethnic Minorities and Whites

Jennifer Kamara

Abstract

In the US, income equality has been an issue discussed throughout the years. Some say the gap between the rich and the poor is steadily growing with racial and ethnic minorities disproportionately occupying the poorer categories. Empirical analysis of the Bureau of Labor Statistics March 2013 Current Population Survey (CPS) reveals that a statistically significant gap in hourly wages exists between Blacks and Hispanics in comparison to Whites. This paper statistically investigated the relationship between race and wages controlling for variables such as age, children, citizenship, education, gender, location type, and marital status. Blinder-Oaxaca Decomposition was used to further investigate which components contributed to the gap in income and how those components varied across Blacks and Hispanics in comparison to Whites. Results indicated that for Blacks, the pure group effect contributed more heavily towards the wage differential while for Hispanics, the endowment effect was the greatest contributor. This indicates that to tackle wage inequality a possible solution may be to diversify policy recommendations for both groups with an emphasis on policies that target systemic discrimination for Blacks and market-valued skills for Hispanics.

Introduction

Income inequality has been an issue discussed throughout the years. In the US, some say the gap between rich and poor is steadily growing, with the rich holding on to the majority of the wealth. Others say racial and ethnic minorities disproportionately occupy the poorer categories. A cursory look at wages of racial and ethnic groups in the Bureau of Labor Statistics March 2013 Current Population Survey (CPS) reveals that a gap does exist between the above-mentioned minorities and Whites. Furthermore, across the country in big cities, suburbs and rural areas, Blacks and Hispanics earn less in hourly income. Advances in civil rights and greater access to education have helped these groups gain employment; however, they have consistently earned lower wages (Alon and Haberfeld, 2007). Understanding what contributes to the income disparity between races is important because only then can policymakers effectively determine which strategies can attempt to encourage more equity in wages.

In a country founded upon the principles of hard work, where self-reliance leads to prosperity, not all of this work materializes into equal wages for racial and ethnic minorities and their White counterparts. According to the CPS 2013 survey, Blacks earn on average about \$5 less per hour than Whites, and Hispanics earn almost \$7 less. As policymakers work to address income equality and promote more mobility, they also work toward understanding what characteristics, qualities, or conditions contribute to this gap. Many point to discrimination as the key culprit in preventing access to equality in wages. Others point to lack of applicable education and experience. Race and class discrimination is emboldened by a system wherein power is assumed by the dominant group (Blalock, 1967). They argue that the mobilization of this power is displayed through hiring decisions and the chronic placement of minorities in lower class groups. Others focused on wage inequality due to where minority groups live and the jobs that each group chose. Kmec (2003) found that wages were lower for workers in mostly

“black and Latino jobs compared to mostly white jobs.”¹ Her findings suggest minorities suffered due to having minority co-workers.² Other studies have also found that high occupational segregation results in Blacks holding more high paying jobs and low occupational segregation results in higher unemployment and greater disadvantages in comparison to Whites (Tiggs et. al, 1993).

This paper seeks to statistically investigate which components contribute to the gap in income and how these components vary across Blacks and Hispanics in comparison to Whites. Determining a method to measure inequality provides a method for *deconstructing* this inequality. Learning more about the composition of this gap and the relationships that exist can also help policymakers in determining what are the most effective policies to address income inequality.

Literature Review

Previous research has focused on many different components of wage inequality throughout the years. Developing an understanding of methods used to capture appropriate components that can help with understanding the relationship between race and wages will ensure the development of an adequate model for analysis. The focus of the literature review will be on literature related to the wage gap for Blacks and minorities and applicable decomposition techniques.

Discussions about the causes of the wage gap often relate to race and class. Thomas (1993) examined both race and class as explanatory factors when determining limited access to personal income for Blacks. His paper goes on to posit that the interaction between race and class can provide a better understanding of the present status of Blacks' access to personal income. His empirical model includes occupation, education, employment status, age, sex, class of worker, urban or suburban residency, region, and marital status. Social class is determined by the occupational, educational, and employment status and is conceptualized as a person's relative position in the market (Thomas, 1993). Parts of his model are ideal because they provide a method to include class without focusing on specific interactions that may be expressed through individual choice, which could lessen the validity of the results. Overall, results showed large differences in the unadjusted mean personal income between Blacks and Whites. Thomas determined that the gap in wages was due primarily to the “combined effects of race, social class, and other nonracial factors” (Thomas 1993, p.333). Later studies confirmed that the inequality in wages between classes has actually increased over the years (Weeden et al., 2007).

Along with class, several other theories exist regarding how individuals succeed in life. Some say everything that is needed to become employed we learn as children, which is similar to the inheritance theory (Loury, 1977). Family background has been

¹ Black and Latino jobs are defined as jobs where 50% or more of the employees are Black (Black jobs) or Latino (Latino Jobs).

² Kmec hypothesized that lower wages occur due to devaluation theory, namely because “pay deterioration follows minority entry into their position (Kmec, 2003 p.54).” Minority workers were hired in these positions specifically because they already occupy a lower socioeconomic status wherein their work is devalued. Her alternate theory suggests a “queuing theory” is responsible for lower wages since employers could hire minorities into lower paying jobs because they feel higher paying jobs would be inappropriate (Kmec, 2003).

DECOMPOSING THE WAGE GAP

shown to have a significant effect on education and occupational success for both Blacks and Whites; however, Blacks were still found to earn significantly less (Loury, 1977).

Human capital theory is another explanation of wage discrepancies. As other researchers have found, workers with higher levels of education, in addition to more job experience consistently earn higher wages. As Weiss (1995) points out, the explanation for this result is that time spent either in school or working on the job can lead to higher worker productivity. Additionally, better-educated workers are those who have a lower probability of quitting, leaving the job or participating in activities that can decrease productivity (Weiss, 1995).

Empirical research devoted to decomposition of the wage gap has focused on the cause of the gap consisting of two components: the coefficient effect and the endowment effect. The endowment effect consists of observable characteristics that can be included in an empirical model such as race, education, marital status, etc. The coefficient effect (or pure group effect) focuses on the unobserved characteristics. Kim (2010) decomposed the wage gap between Whites and Black males over time and found that the significance in race did not decline over time in terms of racially diverse returns to education. In fact, education levels actually rose faster for Blacks during the duration of the study, but significant changes to the wage gap did not materialize because the growing skill premium favored white males (Kim, 2010). In other words, Blacks were increasing their education but the expected return of higher wages did not materialize since this increase in skill favored White males.

Lastly, another study focused on income trajectory as a basis for how much a person could achieve. Alon and Haberfeld (2007) discussed the development of stratified income trajectories for Black, White, and Hispanic women. Studies found that significant racial and ethnic gaps within the group attaching to the labor force resulted in a deficit in labor market experience and wider gap in wages (Alon and Haberfeld, 2007). In this case, the cause of a gap in income was related to the point women in these respective groups became attached to the workforce. The authors found that significant “racial and ethnic gaps exist related to the accumulation of labor force attachment which plays a critical role in creating the divergent wage trajectories for each group” (Alon and Haberfeld, 2007).

Data & Methodology

The data used for this paper comes from the March 2013 CPS. The data is a multistage stratified sample where the first stage divides the sample into primary sampling units (metropolitan areas) and the second stage selects a systematic sample of four housing units per cluster.³ The sample size for the dataset was 315,717, where Blacks and Hispanics were oversampled in an effort to increase the reliability of estimates for each group.

³ Researchers created a categorical variable to identify the metropolitan area size (cbsasz) and a consolidated statistical area code that identified the 30 statistical areas (cmsacode). These variables were combined to create a primary sampling unit for use with survey setting the data. < <http://ceprdata.org/cps-uniform-data-extracts/cps-basic-programs/cps-basic-faq/>>

As mentioned above, a quick glance at the wage variable indicates that a gap exists between Blacks and Whites and Hispanics and Whites.⁴ Examining the wage variable further revealed greater variation and higher wages for those who identified as White. Individuals who identified as Black or Hispanic found the bulk of their wages on the lower end of the spectrum with a few high wage outliers.

After calculating the mean wage for all racial groups, a Wald test shows the difference in wages is significant. Mean wages for racial groups based on geographic location as a subpopulation also show that the difference in wages is significant. All differences in means were significant at the 1% level.

Table 1: Difference in Wages for Blacks, Hispanics and Whites

	Mean Wage	Difference from Whites
Overall	22.37	1.67
Black	18.51	5.53
Hispanic	17.06	6.98
Metro		
Black	18.83	6.17
Hispanic	17.19	7.81
Suburb		
Black	20.09	5.33
Hispanic	17.93	7.49
Central City		
Black	17.99	8.46
Hispanic	16.69	9.77
Rural		
Black	15.22	4.21
Hispanic	15.27	4.16

Source: CPS March 2013 Survey Data

Since the wage variable was skewed, the dependent variable was converted to a log of the preferred wage variable. The independent variable used was race and respondents were categorized as White, Black, Hispanic, Asian or Other. Regressors included variables for age, children, citizenship, city-type (suburb, rural, central city, metro, nyc, la, chi),

⁴ The preferred wage variable for the CPS survey is an hourly wage variable that includes tips, overtime and commission.

DECOMPOSING THE WAGE GAP

education status, gender, and marital status. An interaction variable was also created in an effort to provide information about Blacks and Hispanics in a specific area. Table 2 lists expanded variable information.

Table 2: List of Variables

Dependent	
rw_ot (logwage)	Preferred CEPR wage variable; real wage includes estimates of tips overtime and commissions
Independent	
wbhao	Racial and Ethnic categories
Regressors	
age	Age from 15-85
educ92cat	Education categories
marstat	Marital status
citizen	Citizenship status
female children	
metro	Metro Area
suburb	
centcity	Main city
rural	
local2	Location categories (New York City, Los Angeles, Chicago, and None/Missing)

Source: CPS March 2013 Survey Data

1. Variables have been recoded from the original survey data set. Please see codebook for full description of variables.⁵

To test initial assumptions, contingency tables were created based on the interaction of race and employment, and race and various geographic area types. These tables show a statistically significant relationship at the 1% level for all variables with the exception of race and the suburban geographical area. This confirms that a correlation between variables exists.

To determine differences in mean wages for racial groups, a Weighted Least Squares (WLS) regression was used controlling for age, children, citizenship status, education, gender, marital status, and type of location and regressing log wages on race. The models used include the following:

⁵ <https://cps.ipums.org/cps/resources/codebooks/cpsmar13.pdf>

(1) $\text{Log wage} = \beta + \text{Race}$

(2) $\text{Log wage} = \beta + \text{Race} + \text{Age} + \text{Educ}$

(3) $\text{Log wage} = \beta + \text{Race} + \text{Age} + \text{Educ} + \text{Female} + \text{Marital} + \text{Citizenship} + \text{Children} + \text{Metro} + \text{Central City} + \text{Suburb} + \text{NYC} + \text{LA} + \text{Chi}$

(4) $\text{Log wage} = \beta + \text{Race} + \text{Age} + \text{Educ} + \text{Female} + \text{Marital} + \text{Citizenship} + \text{Children} + \text{Central City} + \text{Suburb} + \text{NYC} + \text{LA} + \text{Chi} + \text{BlackMetro} + \text{HispanicMetro}$

Finally we used the Blinder Oaxaca decomposition technique to identify and quantify the makeup of wage differential for Blacks and Hispanics and Whites. The observable characteristics included variables in our model such as race, age, children, citizenship, education, marital status, and type of location. For the Blinder Oaxaca decomposition we used Model (3) and performed the decomposition over the male subpopulation.⁶

Results

Model (1) produced results that indicate Blacks and Hispanics have lower wages in comparison to Whites (by 21% and 27% respectively). Model (2) took into account age and education status and indicates that the wages for Blacks are 13% lower and 8.9% lower for Hispanics. Each racial group shows a statistically significant difference from Whites with the exception of Asians.

Model (3) focuses on the full regression model controlling for age, children, citizenship, education, gender, marital status citizenship and type of location. Using this model, racial effects on wages are reduced to 11% for Blacks and 9% for Hispanics. This is contrary to Thomas (1993), who found that controlling for different aspects of social class reduced the racial effects by a small amount. In this case, racial effects are reduced by roughly 52%.

Model (4) added an interaction variable of Blacks and metro areas and Hispanics and metro areas. The results of Blacks in metro areas was not statistically significant however we did find that after controlling for all other variables mentioned above in Model (3), Hispanics in metro areas saw a wage differential of about 8%. This is much higher than Hispanics overall who see a difference of about 2%. It is important to note that metro areas in general show an increase in wages of 7%.

Table 3 displays all results. Based on the results from Model (3), which include the different geographic area types and localities, this model was selected to complete the Blinder Oaxaca decomposition.

⁶Research shows that women systemically receive lower wages than men therefore targeting the subpopulation of men can provide a base level understanding of the wage gap for these groups without the added differential due to gender.

DECOMPOSING THE WAGE GAP

Table 3: WLS Regression Results

Regressor	(1)	(2)	(3) Geographic Area	(4) Interaction variables
<i>Race</i>				
Black	-.21***	-.13***	-0.11***	-.10***
Hispanic	-.27***	-.089***	-.09***	-.02**
Asian	.07	-.005	-.004	-.006
Other	-.18***	-.06***	-.04**	-.040**
<i>Age</i>		.008***	.007***	.007***
<i>Education Categories</i>				
Some College		.14***	.14***	.14***
Bachelor's		.51***	.48**	.48***
Masters and above		.73***	.70***	.70***
<i>Female</i>			-.20***	-.20***
<i>Marital Status</i>				
Married			.12***	.12***
Widowed			-.03**	-.03**
Divorced			.11***	.11***
Separated			.05***	.05***
<i>Citizen</i>			.13***	.13***
<i>Children</i>			.09***	.09***
<i>Metro</i>			.07***	.07***
<i>Central City</i>			.05**	.05**
<i>Suburb</i>			.06**	.06**
<i>Local</i>				
NYC			.07***	.07***
LA			.05**	.05***

PEPPERDINE POLICY REVIEW - SPRING 2015

<i>Chi</i>			.02	.02
<i>Blacks and Metro</i>				-0.01
<i>Hispanics and Metro</i>				-0.08***
<hr/>				
Intercept	2.49***	1.85***	1.67***	1.67***
r ²	0.32	0.23	0.27	0.27
# of Observations	165267	165267	163823	163823

1. Reference category for *Race* is White
2. Age category is a continuous variable ranging from 15 to 85
3. Reference category for *Education* is No College
4. *Female* is a binary variable where female =1
5. Reference category for *Marital Status* is Never Married
6. *Citizen* is a binary variable where citizen =1
7. *Children* is a binary variable where having any number of children =1
8. *Metro* is a binary variable where living in a defined metro area =1
9. *Central City* is a binary variable where living in a defined central city area =1
10. *Suburb* is a binary variable where living in a defined suburb area =1
11. Reference category for *local2* is None/Missing.
12. *** $p < .01$, ** $p < .05$, * $p < .10$
13. Number of Observations in sample = 315,717

DECOMPOSING THE WAGE GAP

The decomposition of the wage gap over the male subpopulation produces contrasting results for the identification and quantification of the pure group effect and endowment effect that contribute to the wage gap. For Blacks, the gap in wages is 21.0% due primarily to the pure group effect (66.8%). Hispanics have a larger gap in wages of about 29.8%, which is due primarily to the endowment effect. Table 4 displays the summary of the Oaxaca Decomposition results.

Table 4: Summary of Oaxaca Decomposition Results

	Endowment Effect	Pure Group Effect	Gap
Black	33.12%	66.88%	21.0%***
Hispanic	62.95%	37.05%	29.8%***

1. *** $p < .01$, ** $p < .05$, * $p < .10$

2. All endowment, coefficient effects were statistically significant at the 1% level with a p-value of 0.00

Expanded Blinder Oaxaca decomposition results provide even more insight into possible contributors to the composition of the wage gap for Blacks and Hispanics. For Blacks the endowment effect is largely due to education and age, which are significant at the 1% and 5% level respectively. Almost 45% of the coefficient effect is due to citizenship, which could relate to the wage variable that was used and limited wages reported by Black citizens.⁷ The lack of children provides the biggest reduction in the coefficient effect by about 16%. Overall these expanded results suggest that as far as observable characteristics are concerned, age and education make large contributions toward the wage differential present between Blacks and Whites.

For Hispanics, again we see education (18%) and age (74%) contributing the most in explaining variations in wages. Both are significant at the 1% level. The pure group effect suggests age, at 57.6%, as the main contributor to the gap in wages. Similar to Kim (2010), the aging of the population for Hispanics contributed greatly towards the pure group effect. There is also a reduction in the gap due to citizenship status (15.7%), which would be expected since it may be easier to gain employment if you have full citizenship. The only geographic area type with significant results was the Metro area. The contribution of Metro to the pure group effect could be due to poor infrastructure as Kim (2010) suggested or occupational segregation as Kmec (2003) suggests. Table 5 displays a summary of the expanded Blinder Oaxaca decomposition results.

⁷The wage variable includes overtime wages received during the previous week. It may be that citizens are less likely to work in occupations where they would receive overtime even with the inclusion of adjusted weekly earnings.

PEPPERDINE POLICY REVIEW - SPRING 2015

Table 5: Oaxaca Decomposition Levels for Blacks and Hispanics in metro areas

<i>Black</i>					<i>Hispanic</i>				
Variable	Endowment Effect		Pure Group Effect		Variable	Endowment Effect		Pure Group Effect	
	Level	% of explained	Level	% of unexplained		Level	% of explained	Level	% of unexplained
Age	0.0082	11.84***	-0.0028	-2.13	Age	0.0350	18.66***	0.0930	57.60***
Education	0.0507	72.74**	-0.0028	-2.12	Education	0.1404	74.91***	0.0126	7.78
Marital Status	0.0197	28.27	0.0028	2.12	Marital Status	0.0100	5.36	0.0375	23.21
Citizen	-0.0043	-6.15**	0.0589	45.05**	Citizen	0.0140	7.45***	-0.0254	-15.71***
Non Citizen	-0.0041	-5.92**	-0.0040	-3.09**	Non Citizen	0.0140	7.45***	0.0155	9.57***
Children	0.0023	3.31***	0.0090	6.85***	Children	-0.0048	-2.56***	0.0045	2.81
No Children	0.0023	3.31***	-0.0213	-16.29***	No Children	-0.0048	-2.56***	-0.0066	-4.09
Metro	-0.0015	-2.17	0.0081	6.23	Metro	-0.0026	-1.38	0.0286	17.70***
No Metro	-0.0015	-2.17	-0.0008	-0.60	No Metro	-0.0026	-1.38	-0.0021	-1.31
Central City	-0.0018	-2.62	-0.0006	-0.47	Central City	-0.0019	-1.02	0.0031	1.90
No Central City	-0.0018	-2.62	0.0009	0.68	No Central City	-0.0019	-1.02	-0.0042	-2.59
Suburb	0.0015	2.16	-0.0039	-2.95	Suburb	0.0015	0.78	0.0036	2.23
No Suburb	0.0015	2.16	0.0057	4.33	No Suburb	0.0015	0.78	-0.0051	-3.19
NYC	-0.0010	-1.47	0.0026	1.97	NYC	-0.0008	-0.40	-0.0004	-0.26
LA	-0.0004	-0.51	-0.00111	-0.85	LA	-0.0038	-2.05	0.00703	4.35
Chicago	0.0000	0.06	0.00044	0.34	Chicago	0.0002	0.09	-0.02575	-15.95
None/Missing	-0.0001	-0.21	0.00044	0.34	None/Missing	-0.0058	-3.11	-0.02575	-15.95
constant	0.0000	0.00	0.07917	60.61**	constant	0.0000	0.00	-0.05971	-36.99***
Total	0.0696	100.00	0.1306	100.00	Total	0.1874334	100.00	0.1614163	100.00

DECOMPOSING THE WAGE GAP

Discussion

The weighted regression analysis provided results that suggested a corollary relationship between race and ethnicity and wages. Initially our review of CPS data revealed a gap in wages; however, the regression results suggested changes in the severity of the gap after controlling for various characteristics. The drop in wage differential by more than 50% when controlling for marital status, citizenship, children, gender, and geographic area type suggest that there are many factors that affect wage. Furthermore, the results of the Blinder Oaxaca decomposition of the wage gap show that even within those factors, it is very difficult to fully determine the composition of the gap.

Within the expanded decomposition model, various levels of contribution existed for each variable chosen, but it is important to note that many of these levels were not statistically significant. The variables chosen served as observable characteristics, but there are other observable characteristics that can also help provide more information related to wages. Regarding the pure group effect, it is extremely difficult to make a generalization regarding unobserved characteristics. With that said, the importance of this work is the alternate results for Blacks and Hispanics regarding the percentage of contribution of each effect. Decomposition results suggested that for Blacks and Hispanics, the major contributors to the wage gap were not the same. For Blacks, the greatest contributor to the wage gap was the pure group effect that relates to characteristics that we cannot observe within the model. For Hispanics, the greater contributor was the endowment effect that focuses on the characteristics included in the model. These results suggest that attacking wage inequality for minorities collectively won't ensure that the policies will result in a reduction in the wage gap.

In an effort to increase efficacy, policymakers could focus on a multifaceted approach for each group. The larger pure group effect for Blacks suggests that targeting systemic racial discrimination can have better results. Alternately, the larger endowment effect for Hispanics suggests that a focus on acquiring market valued skills can be helpful in moving towards wage equality.

These results confirm the prevalence of a gap in wages for Blacks and Hispanics, but it is important to note the limitations that exist. Regarding internal validity, the model could be strengthened with the addition of experience or job tenure. The ability to earn higher wages is related to the amount of applicable experience that you have. Age helps to include an *assumed* indicator of experience but confirmed years of service would be much more beneficial. It is also important to note, like Thomas (1993), survey data includes information for all respondents. However, in order to generate a log wage variable, only those who are employed and who received wages are included. A disproportionate part of the Black and Hispanic population could be left out because they were not employed.⁸ Additionally, there was a small loss of respondents once we controlled for the metro area, but since it was less than 10%, our concern in that regard is minimal.

Regarding external validity, since the sample is a multi-level stratified sample with population weights in use, it can be used as a representative sample of the entire US population. However, only those with a wage to report are included in the regressions resulting in the overall sample size dropping by almost 52%. The amount of people

⁸ The current unemployment rate for Blacks in the US is 12.0% and 8.7% for Hispanics. This exceeds the unemployment rate for Whites which is 6.2% (Bureau of Labor Statistics March 2015).

without a wage to report is much higher than the national unemployment average. Another threat that exists is the Hawthorne Effect, since the very design of the CPS survey is that individuals know they are participating and could adjust behavior.

Conclusion

Empirical analysis of the wage gap between Blacks and Whites and Hispanics and Whites provides information that confirms the existence of the wage gap, while also supposing the possible construction of that gap. Decomposition results show significant values for the explained and unexplained parts of the wage gap between these groups, but it is also important to note that once those levels are expanded, some of the various components become less significant. These results can help policymakers understand the necessity of a diversified approach towards addressing income inequality.

DECOMPOSING THE WAGE GAP

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