Are Old Age Workers Out of Luck? – An Empirical Study of the U.S. Labor Market

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Introduction

There have been a variety of studies on the effects of demographical traits on the rate of unemployment, and yet very few consider age. Of those that do, even fewer have attempted to quantify the impact of one's age on unemployment using regression analysis. As the United States population continues to age, discrimination towards older workers will become more of a hot topic for politicians to consider, and so age needs to be an included factor in studies on unemployment. If age is a strong factor affecting a person's ability to find and keep a job then politicians will need to know this in order to further protect these workers.

There are two opposing factors affecting an older worker's chances of finding employment. The first is that older workers have more experience than younger workers and often have a broader network of contacts to call upon when seeking employment. The second factor is the various stigmata associated with older workers that keep some employees from hiring them, such as lower productivity compared to younger workers and an inability to adapt to emerging technologies. Because it is employers' perceptions of older employees that matter in the hiring process, it is not important whether or not these perceptions are accurate, and so this paper will not attempt to establish whether these stigmata are founded in reality. Instead, this paper uses regression analysis of the unemployment rate on various demographic factors including age, sex, race, education, income, and population density to quantify the impact of age on the overall unemployment rate.

The data used for this regression comes from a variety of U.S. government sources and contains data at the county level for the entire United States. The null hypothesis going into this study is that age has no significant impact on the U.S. unemployment rate. Age is the variable of interest for this study, but other demographic factors are looked at as well.

The findings produced by this regression are surprisingly significant and support previous research on discrimination in employment while supplying some conflicting results as well. The most rigorous form of the regression using state-fixed effects shows that a 1% increase in the ratio of the population aged 60-64 to the population aged 40-44 causes a .1163% increase in the unemployment rate. In contrast, increasing the ratio of the population of every other age group in the study to the 40-44 group either caused a decrease in the unemployment rate, or the results were not statistically significant. The results for the 60-64 group were statistically significant at the 95% level and indicate that older workers do, in fact, face more difficulty finding jobs than younger workers.

Literature Review

In an article written for the Federal Reserve Bank of Atlanta, author Lela Somoza discusses a variety of demographic factors affecting the unemployment rate in America. In particular, she looks at age, sex, race, and educational attainment levels. Somoza finds that younger workers fair much worse in the job market than older workers do, which is in contrast to most of the findings from our own regression (Somoza 8-9).

Somoza also discusses the effects of sex (or "gender," as she puts it) on unemployment. Somoza discusses the effects of sex on unemployment in the context of the United States' most recent recession. She finds that during periods of recession men are usually hit harder than women when it comes to unemployment, which was the case in the most recent recession as well. However, Somoza also found that during the recovery period the unemployment rate for men dropped even as the rate for women increased. She writes, "After peaking above 11 percent in October 2009, the male unemployment rate has declined slowly but steadily. Meanwhile, the jobless rate for women continued to rise until November 2010 and has declined less than a percentage point since then" (Somoza 7). Somoza's results show that studying unemployment during a recession and/or post-recession recovery can lead to atypical results. An opportunity for further research would be to expand the scope of this research to account for time-fixed effects.

Somoza's findings on race's effect on unemployment rates are mostly what one would expect. She finds that minorities experienced higher rates of unemployment than whites during the recession, but she also finds that they were not hit as hard as they had been in previous recessions. Somoza reports that ". . . the unemployment rate peaked at 16.7 percent for blacks, 13.1 percent for Hispanics, and 9.3 percent for whites" (Somoza 9). Our regression shows that the percentage of the population that is white is negatively correlated with the unemployment rate. Specifically, a 1% increase in the white population causes a .2077% decrease in the unemployment rate. Asians also experience this effect, though to a lesser extent than whites (1% increase in the Asian population causes a .0143% decrease in the unemployment rate). These results are significant at the 95% level or greater. Our results for the black population also show a slight negative correlation when taking state-fixed effects into account, but this finding was not statistically significant, suggesting that there are likely other factors affecting the effect of the percentage of black population on the unemployment rate that we failed to control for. One possibility is that, according to Somoza, blacks have a disproportionately high representation in the public sector, which experienced higher levels of growth during the recession than most industries. Since our regression did not control for varying types of industry, this may account for the lack of significance on the percentage black variable.

The last demographic factor Somoza discussed is educational attainment, which is of course a key component to the rate of unemployment. It is not hard to imagine why higher levels of education would lead to lower levels of unemployment, but it is worth noting which levels of educational attainment have the greatest impact on the unemployment rate. Somoza compares the impacts of having just a high school education, having completed some college, and having graduated from college on the rate of employment for those between the ages of 23 and 24. Her results show that

going from just a high school education to some college made the biggest difference (64% employment rate compared to 79%) while going from some college to graduating provided an increase of 9% to an employment rate of 88% (Somoza 11). These results are supported by our regression.

In her paper titled "Unemployment Rate a function of Population and Economic conditions," Divya Mishra of the Purdue University School of Management uses regression analysis to determine the effect of GDP and population on unemployment. It was Mishra's study that inspired our use of income as an additional control variable. Mishra found that a 1% increase in GDP increased the unemployment rate by .04445% and that 1% increase in the population increased the unemployment rate by .16171%. By point of comparison, our regression showed that a 1% increase in income (which we use as a substitute for GDP) causes a .4450% decrease in the unemployment rate. Instead of including size of labor force as a regressor, our paper uses population density in order to capture the differences between urban and rural counties on the unemployment rate. Our results for income were drastically different from Mishra's results, but it should be noted that Mishra notes in her paper that GDP should logically be negatively related to unemployment, as our study shows it is, despite the contrarian results of her regression (Mishra 1-11).

Model/Theories Used

The dependent variable in the regression is the unemployment rate. The following was taken from the Bureau of Labor Statistics website concerning how the unemployment rate is defined:

> Persons are classified as unemployed if they do not have a job, have actively looked for work in the prior 4 weeks, and are currently available for work. Persons who were not working and were waiting to be recalled to a job from which they had been temporarily laid off are also included as unemployed. Receiving benefits from the Unemployment Insurance (UI) program has no bearing on whether a person is classified as unemployed. . . The unemployment rate represents the number unemployed as a percent of the labor force (United States. Bureau of Labor Statistics).

The independent variables are as follows: age, as represented by the number of people in each age group included in the population; race, as represented by the percentage of the population that falls under each racial group covered (whites, blacks, and Asians); sex, as represented by the percentage of the population that is female; educational attainment, as represented by the number of people that fall into each educational attainment group in the population divided by the civilian labor force of the county; income in dollars; and population density. The definitions for each variable are shown in Figure 2 on page 9.

Age is included as a regressor in order to test for preferences for certain age groups in the labor market. Age is defined as the population of the county that falls within the age group divided by the population within the county that falls within the 40-44 age group. The reason for defining age this way is to account for county size. Using

only the total population in each age group would distort the results of the regression due to the difference between county sizes. A large county might have a small percentage of old age workers but still have many more old age workers than a smaller county simply due to differences in total population. Dividing each group by the 40-44 group corrects for this by defining the age variable as a ratio, making the age makeup of the county the variable of interest.

Race and sex were included to control for these factors on the unemployment rate. The race variables evaluated were %White, %Black, and %Asian. An obvious omission from this set is the percentage of the population that identifies as Hispanic only. The reason for this is the difficulty in finding county-level Hispanic-only data that is clearly defined in the same way that the white-only, black-only, and Asian-only data is defined. Rather than erroneously choosing Hispanic data that may or may not have been measured in the same way that the other groups were measured, it was decided that it would simply be dropped from the model. This may add some bias from counties with large Hispanic populations, but this effect on the model is unlikely to be significant.

Educational attainment was included to control for education's effects on hiring preferences. The education data is for individuals that are age 25+. For this reason, the age variables evaluated begin at age 25 in order to make the data consistent. As was stated previously, the education variables are defined as the number of people with each highest educational attainment level divided by the civilian labor force of the county. The reason for dividing by the civilian labor force is to change the variable into a ratio that controls for both differences in education levels and for differences in county size.

Income was included to account for differences in wealthy counties versus poorer counties. One source of bias that could come from this variable is that different counties have different costs of living, reducing the comparability of the income from one county versus another based on location. This bias should be somewhat mitigated by controlling for state-fixed affects. This will reduce the bias across states but bias between counties will still remain. The magnitude of the coefficient on the income variable is reduced from -0.5324 to -0.4450, both at 99% significance levels, which indicates that accounting for state-fixed effects did in fact reduce the effect this bias had on the model.

Lastly, population density was included to help account for differences between urban and rural counties. Higher population density tends to lead towards higher competition for jobs in an area, which pushes the unemployment rate for the county upwards. This is evidenced by the coefficient for the population density variable being both positive and statistically significant at the 99% level.

The model used is a log-log regression model, which estimates the magnitude of the causal relationship between each independent variable with the dependent variable, holding the other independent variables constant. The results of this regression have an elasticity interpretation. This means that the model tells us how much the dependent variable will change as a percentage when a particular independent variable is increased by 1%. The log-log model is useful when the relationship between the dependent and independent variable(s) is nonlinear, which is often the case. The underlying assumptions of this model are that: 1) the expected value of the error term given each independent variable is 0; 2) the independent variables and the dependent

variable are independently and identically distributed, meaning that the probability distributions for each variable have identical distributions that do not depend on the other variables; 3) there are no large outliers; and 4) there is no perfect multicollinearity, which means that the independent variables are not strongly correlated with any other independent variable in the regression.

In addition to the regular log-log regressions that were run for the study, we also ran a log-log regression that included state-fixed effects. The idea behind including this change was to account for regional effects in the data, such as a variable that had a different impact in one state versus another. Controlling for state-fixed effects helps us to refine our estimations so that they are that much closer to their true values.

Methodology and Data

The data set used in this study was a conglomeration of several data sets created by the Bureau of Labor Statistics and the United States Census Bureau (links to find each variable are provided in the References section of the paper). Each data set contained county level data for the entire United States, but they were not all identical. Some of the data sets lacked data for certain variables for certain counties, and so each data set had to be merged together by removing those counties which did not have data for every variable. Most states had very few counties that needed to be removed proportional to the number of counties represented in the final data set, so we do not believe this will have a significant impact on the relevance of our results. It was important that every county included have data for every variable so that we could run a state-fixed effects regression to account for regional effects in the data.

The resulting data set contains data on the unemployment rate, the ratios of various age groups to the comparison group of people aged 40-44, which then needed to be dropped from the regression, the percentage of the population that was white, the percentage of the population that was black, the ratio of the number of people with certain levels of education to the total civilian labor force, included the average income, and included the population density, all for each county from a list of 3086 counties. This provided a very large, complete dataset with which we could run our regression. To actually run the regression STATA was used to generate the logarithms of each variable and was then used to run the regressions. Four regressions were run in total. The first only included the age variables. The second included only the age variables and the race variables since it was hypothesized that out of the variables left race would have the largest impact on unemployment. The third and fourth regressions included all of the variables, but the fourth also included state-fixed effects while the third regression did not. For a more detailed look at the econometric techniques that the regression was founded on, see the section titled “Model/Theories Used.”

Results

The results of our study are presented in the table below. Each regression we ran produced different results, gaining higher adjusted R^2 values as more regressors were added and state-fixed effects were controlled for.

The first regression included only the age groups (25-29, 30-34, 35-39, 45-49, 50-54, 55-59, and 60-64). The equation associated with this regression is:

U. Rate = f(age)

The coefficients for the natural logs of the Ages 25-29, 35-39, 45-49, 50-54, 55-59, and 60-64 were all statistically significant at the 90% level or higher. The coefficient for Ages 30-34 was not statistically significant. The adjusted R^2 value for this regression, however, was only .2220, which means that these results only explain 22.2% of the variation in the unemployment rate.

The second regression included racial factors as additional regressors since it was reasoned that out of the variables for which data was collected, race would likely have the greatest impact on the unemployment rate. The equation associated with this regression was:

U. Rate = f(age, race)

In this regression every coefficient was statistically significant at the 90% level or greater except for the coefficient on the natural log of Ages 30-34. The adjusted R^2 value for this regression was .3178, which means that this regression explains 9.58 percentage points more of the variation in the unemployment rate than the first regression.

The third regression included every regressor to further refine our estimates. Sex, education, income, and population density were added. The equation produced by this regression was:

U. Rate = f(age, race, sex, education, income, pop. density)

In this regression the coefficients on the natural logs of Ages 25-29, 50-54, 60-64, %White, %Black, %Asian, Below 9^{th}, 9^{th}-12^{th}, High School or Equivalent, Some College, Associate's Degree, Bachelor's Degree, Graduate Or Professional Degree, Income, and Population Density were all statistically significant at the 90% level or higher while Ages 30-34, 35-39, 55-59, and %Female were not statistically significant. The adjusted R^2 value for this regression is .5763, representing a 25.85 percentage point increase over the second regression.

The last regression included the same regressors as the third regression, but also controlled for state-fixed effects. The final equation is thus:

U. Rate = f(age, race, sex, education, income, pop. density, state-fixed effects)

Controlling for state-fixed effects had a significant impact on the results. The coefficients for the natural logs of Ages 25-29, 45-59, 50-54, 60-64, %White, %Asian, %Female, 9^{th}-12^{th}, HS or Equivalent, Some College, Grad. Or Prof. Degree, Income, and Pop. Density were all statistically significant at the 90% level or greater. Adding state-fixed effects caused several differences from running the regression without controlling for them. Ages 45-49 became significant at the 90% level, %Female became significant at the 99% level, and HS or Equivalent became more significant, while %Black, Below 9^{th}, Assoc. Degree, and Bachelor's Degree became insignificant and %Asian and Some College became less significant. These results show that controlling for state-fixed effects reduces the impact that certain education categories and race has on unemployment while revealing the quite significant impact that sex has on unemployment. The R^2 value for this regression was .7946, .2183 higher than the third regression's R^2 value. In addition, the F-stat used to test the joint hypothesis that all of the state-fixed effects were equal to 0 was computed as 72.63, well above the amount needed to disregard the joint hypothesis and conclude that there are statistically significant state-fixed effects present. For further evaluation, the results of each regression can be found in full in Figure 1 on page 8.

Figure 1: Log-Log Regression Estimates of the Unemployment Rate Using Data from Over 3000 U.S. Counties in 2010

Dependent Variable: ln(Unemployment Rate)

Regressor	(1)	(2)	(3)	(4)
ln(Ages 25-29)	-0.1583***	-0.3464***	-0.2828***	-0.1336***
	(0.0609)	(0.0594)	(0.0499)	(0.0437)
ln(Ages 30-34)	-0.1180	-0.0514	0.0035	0.0189
	(0.0997)	(0.0951)	(0.0805)	(0.0685)
ln(Ages 35-39)	0.3628***	0.3849***	0.0476	0.0544
	(0.1021)	(0.0939)	(0.0784)	(0.0602)
ln(Ages 45-49)	-0.7638***	-0.7281***	-0.4293	-0.1326*
	(0.1269)	(0.1179)	(0.1056)	(0.0752)
ln(Ages 50-54)	-0.7678***	-0.6542***	-0.2029*	-0.1388*
	(0.1484)	(0.1378)	(0.1052)	(0.0765)
ln(Ages 55-59)	-0.3806***	-0.2857**	0.1563	-0.0121
	(0.1307)	(0.1220)	(0.0954)	(0.0736)
ln(Ages 60-64)	0.8077***	0.7814***	0.1504**	0.1163**
	(0.0712)	(0.0693)	(0.0599)	(0.0498)
ln(%White)		-0.3077***	-0.2604***	-0.2077***
		(0.0278)	(0.0336)	(0.0222)
ln(%Black)		0.0312***	-0.0159***	0.0011
		(0.0044)	(0.0046)	(0.0038)
ln(%Asian)		-0.0170***	0.0443***	-0.0143**
		(0.0063)	(0.0085)	(0.0067)
ln(%Female)			0.0169	0.6297***
			(0.1235)	(0.0986)
ln(Below 9th)			-0.0479***	-0.0005
			(0.0116)	(0.0103)
ln(9th-12th)			0.2076***	0.1135***
			(0.0223)	(0.0189)
ln(HS or Equivalent)			0.0701**	0.2470***
			(0.0315)	(0.0305)
ln(Some College)			0.1936***	0.0573**
			(0.0260)	(0.0235)
ln(Assoc. Degree)			0.0430***	0.0189
			(0.0159)	(0.0145)
ln(Bachelor's Degree)			-0.1610***	0.0147
			(0.0238)	(0.0185)
ln(Grad. Or Prof. Degree)			0.1247***	0.0594***
			(0.0159)	(0.0131)
ln(Income)			-0.5324***	-0.4450***
			(0.0426)	(0.0362)
ln(Pop. Density)			0.0602***	0.0425***
			(0.0060)	(0.0052)
Intercept	2.4863***	3.7557***	9.3920***	5.6589***
	(0.0156)	(0.1280)	(0.6179)	(0.4930)
	(1)	(2)	(3)	(4)
Number of Observations	3086	3086	3086	3086
Adjusted R^2	.2220	.3178	.5763	.7946
State-Fixed Effects?	No	No	No	Yes
F-Stat Testing if all State-Fixed Effects are Jointly 0	N/A	N/A	N/A	72.63

* Indicates Significance at the 90% Level
** Indicates Significance at the 95% Level
*** Indicates Significance at the 99% Level

Figure 2: Variable Definitions	
Variable Name	Definition
Unemployment Rate	Percentage of the labor force unemployed.
Ages 25-29	Total population aged 25-29 divided by total population aged 40-44.
Ages 30-34	Total population aged 30-34 divided by total population aged 40-44.
Ages 35-39	Total population aged 35-39 divided by total population aged 40-44.
Ages 45-49	Total population aged 45-49 divided by total population aged 40-44.
Ages 50-54	Total population aged 50-54 divided by total population aged 40-44.
Ages 55-59	Total population aged 55-59 divided by total population aged 40-44.
Ages 60-64	Total population aged 60-64 divided by total population aged 40-44.
%White	Percentage of population that is white only.
%Black	Percentage of population that is black only.
%Asian	Percentage of population that is asian only.
%Female	Percentage of population that is female.
Below 9th	Total population 25+ with less than 9th grade education attainment divided by total civilian labor force.
9th-12th	Total population 25+ with 9th-12th grade education attainment divided by total civilian labor force.
HS or Equivalent	Total population 25+ with HS diploma or equivalent divided by total civilian labor force.
Some College	Total population 25+ with some college but no degree divided by total civilian labor force.
Assoc. Degree	Total population 25+ with an Associate's Degree as highest divided by total civilian labor force.
Bachelor's Degree	Total population 25+ with a Bachelor's Degree as highest educational attainment divided by total civilian labor force.
Grad. Or Prof. Degree	Total population 25+ with a Graduate or Professional degree as highest educational attainment divided by total civilian labor force.
Income	Average income of the county.
Pop. Density	Total population divided by total area of the county in square miles.

Figure 3: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max	Units
Unemployment Rate	3086	9.18	3.13	1.60	29.90	%
Ages 25-29	3086	94.07	22.38	38.00	339.00	%
Ages 30-34	3086	91.45	14.85	39.00	217.00	%
Ages 35-39	3086	94.05	9.40	39.00	165.00	%
Ages 45-49	3086	118.66	14.71	73.00	305.00	%
Ages 50-54	3086	123.07	22.21	56.00	330.00	%
Ages 55-59	3086	114.21	26.65	41.00	420.00	%
Ages 60-64	3086	100.97	28.00	39.00	445.00	%
%White	3086	83.05	16.78	2.70	99.20	%
%Black	3086	8.75	14.40	0.00	85.70	%
%Asian	3086	1.13	2.48	0.00	43.90	%
%Female	3086	50.01	2.20	27.90	56.80	%
Below 9th	3086	9.72	6.89	0.00	58.00	%
9th-12th	3086	14.79	7.58	1.00	60.00	%
HS or Equivalent	3086	49.35	13.83	2.00	101.00	%
Some College	3086	27.64	6.26	1.00	89.00	%
Assoc. Degree	3086	9.84	3.28	0.00	52.00	%
Bachelor's Degree	3086	16.12	6.02	1.00	86.00	%
Grad. Or Prof. Degree	3086	8.19	4.22	0.00	48.00	%
Income	3086	33,996	7,816	15,924	111,122	$
Pop. Density	3086	244	1,742	0	70,173	People/Sq. Mi.

Figure 4: Correlation Matrix

	U. Rate	Age2529	Age3034	Age3539	Age4549	Age5054	Age5559	Age6064	%White	%Black	%Asian	%Female	Bel.9th	9th-12th	HS or Eq.	Some Coll.	Assoc.	Bach.	Grad.	Income	Pop. Dens.
U. Rate	1.00																				
Age2529	-0.13	1.00																			
Age3034	-0.10	0.83	1.00																		
Age3539	0.02	0.57	0.74	1.00																	
Age4549	-0.29	-0.07	-0.07	-0.10	1.00																
Age5054	-0.27	-0.07	-0.06	-0.13	0.87	1.00															
Age5559	-0.18	-0.09	-0.08	-0.11	0.79	0.91	1.00														
Age6064	-0.05	-0.19	-0.17	-0.13	0.67	0.79	0.89	1.00													
%White	-0.30	-0.31	-0.25	-0.18	0.25	0.27	0.26	0.26	1.00												
%Black	0.33	0.17	0.14	0.12	-0.19	-0.20	-0.18	-0.17	-0.79	1.00											
%Asian	-0.01	0.16	0.11	0.07	-0.21	-0.23	-0.23	-0.24	-0.27	0.02	1.00										
%Female	0.05	-0.16	-0.18	-0.09	-0.02	0.02	0.03	0.06	-0.03	0.12	0.00	1.00									
Bel.9th	0.30	-0.02	0.04	0.07	-0.17	-0.19	-0.14	-0.06	-0.22	0.21	-0.10	-0.12	1.00								
9th-12th	0.53	-0.09	-0.04	0.06	-0.21	-0.22	-0.16	-0.02	-0.36	0.47	-0.20	-0.14	0.65	1.00							
HS or Eq.	0.39	-0.34	-0.26	-0.16	0.10	0.11	0.14	0.25	0.09	0.10	-0.35	-0.14	0.34	0.63	1.00						
Some Coll.	0.18	-0.05	-0.02	-0.03	0.21	0.26	0.30	0.34	0.00	-0.03	-0.09	-0.14	-0.09	0.09	0.21	1.00					
Assoc.	0.08	-0.12	-0.11	-0.14	0.18	0.22	0.21	0.18	0.10	-0.08	-0.01	-0.03	-0.21	-0.10	0.09	0.43	1.00				
Bach.	-0.20	0.07	0.01	-0.02	0.02	0.04	0.06	0.03	-0.02	-0.04	0.39	0.09	-0.42	-0.47	-0.48	0.15	0.18	1.00			
Grad.	-0.01	0.11	0.00	0.00	-0.16	-0.14	-0.08	-0.04	-0.08	0.05	0.43	0.17	-0.32	-0.30	-0.40	-0.04	0.04	0.71	1.00		
Income	-0.45	0.01	-0.05	-0.13	0.15	0.15	0.08	-0.03	0.10	-0.17	0.33	0.13	-0.41	-0.60	-0.54	-0.12	0.05	0.59	0.47	1.00	
Pop. Dens.	0.01	0.14	0.13	0.08	-0.12	-0.12	-0.12	-0.11	-0.15	0.09	0.30	0.09	-0.01	-0.04	-0.13	-0.09	-0.05	0.21	0.28	0.27	1.00

Conclusion

Discrimination in unemployment is something that has widely been researched when it comes to demographic factors such as race and sex, but there is very little quantitative research on unemployment as it relates to age. It is easy to dismiss age-based discrimination as being less important since it is something that everyone who lives out their natural lives will experience at some point and so affects everyone, but that is precisely why it should NOT be ignored. Any time productive workers are overlooked because of an arbitrary factor that does not affect their performance the basic tenant of economics has been violated: that scarce resources should be distributed where they provide the greatest utility. So long as competent workers are sitting at home because of their age when they could be in the work force providing competent labor and passing on valuable skills and knowledge to younger employees the economy will suffer as a result.

Using regression analysis of county-level data collected from U.S. government agencies, this paper has shown that age discrimination is in fact prevalent in the United States, despite reports to the contrary. After controlling for state-fixed effects and including many additional regressors to better refine the results of the regression, we found that young workers aged 25-29 fare better in the job market than all but the 50-54 group. This is likely because this age group has much greater mobility than any other group. Younger workers are less likely to have families and homes that tie them down to an area and prevent them from leaving in search of work, and so young workers tend to face less unemployment as a result. Results for Ages 30-34 and 35-39 were not statistically significant, indicating that age was not a major factor for workers in these age groups compared to the 40-44 group. This makes sense, as experience is likely to have diminishing returns, making it less of a factor in hiring decisions as age increases. This effect reverses around Ages 45-49 and Ages 50-54, however. One explanation for these results is that both experience and time spent with a firm becomes significant at higher age levels for the purposes of management and supervision of employees. Workers above a certain age are less likely to leave a firm, making them more attractive for management and supervisory positions. This effect becomes blurred around Ages 55-59, however, as shown by its statistical insignificance in our regression, while the sign on the coefficient completely reverses by Ages 60-64. At this point the experience advantage of older workers is overshadowed by the biases against them, making it harder for them to find work.

While the results produced in this paper were largely statistically significant with a high adjusted R^2 value, there are some key ways in which our regression could have been improved. The two most important things to consider adding would be controls for industry type and time-fixed effects. Industry type is a significant factor in unemployment as markets shift and evolve and so should be accounted for if possible. In addition, finding data sets for other census years to aid in controlling for time-fixed effects would also likely improve the regression by controlling for factors that would vary over time. This could take out some of the effects of the recent recession and recovery period in our data, for example. Age-based discrimination is an issue that has largely been overlooked, and which will only grow bigger as the population continues to age. Moving forward, the most important step in addressing age-based discrimination in

employment is to do further quantitative research on the effects of age on unemployment so that policy makers have the tools they need to make informed decisions on how to best protect these workers.

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