The Link between Suicide and Unemployment

Bob Ladd
rladd@iwu.edu

Recommended Citation

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Abstract

The field of behavioral economics looks at the ways in which human factors are related to economic trends. Health economics looks at efficiency and value in health and healthcare decisions. The relationship between suicide and unemployment can be viewed through these lenses. This study hopes to examine the relationship between these two variables by analyzing data in the U.S. across time.

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I. INTRODUCTION

The field of behavioral economics looks at the ways in which human factors are related to economic trends. Health economics looks at efficiency and value in health and healthcare decisions. The relationship between suicide and unemployment can be viewed through these lenses. This study hopes to examine the relationship between these two variables by analyzing data in the U.S. across time.

The 10th leading cause of death in the U.S. in 2016 was suicide which costs the U.S. an estimated $69 billion annually in lost labor and costs of services after a suicide. (American Foundation for Suicide Prevention). For these reasons, suicide is a significant problem in the U.S. and efforts that could improve the situation would have beneficial economic effects. Attempts to reduce suicides, when successful, not only would benefit the economy by keeping more people in the workforce, but, would increase the quality of life across the workforce.

In 2016 nearly 45,000 Americans died by suicide. Additionally, suicide rates varied widely across states with the lowest rate of 6.9 per 100,000 residents, to the highest rate of 29.2 per 100,000 residents (Centers for Disease Control and Prevention, 2018). Simultaneously, over the last 50 years, unemployment rates have gone through 6 complete cycles with values gradually increasing or decreasing but varying between 3.4% and 10.8% (Federal Reserve Bank of Saint Louis). As both variables are changing over the time period, it is likely that many factors affect both. A strong correlation between them, would indicate that the changes in each variable is related to the changes in the other. If a correlation were present, it would not indicate a direction of causality, but would imply that either one factor affects the other, or a third factor affects both in the same direction. Either way, it would be efficient to focus efforts on reducing one factor and that should have some effect on the other.

Relationships between suicide and unemployment have been studied extensively. Cummings (2018) writes that past research has attributed 1 in 5 deaths from suicide to unemployment. However, previous research, conducted with similar methods to those employed in this study, found slight correlations only. This indicates that the conclusion could be inaccurate and further research with different samples to show whether these results remain consistent or were a statistical anomaly in one study.

Additionally, there are discrepancies between suicide rates by age, race and gender. The relationship between these demographic indicators and suicide could confound the relationship between suicide and unemployment. But it's likely that there are many contributing factors to this complex situation. For example, the highest level of suicide in 2016, by age, is among 45- to 54-year-olds (American Foundation for Suicide Prevention, 2016). This age range typically is heavily involved in the work force and so it is likely to be one of the more affected groups by unemployment fluctuations. This is supported by the fact that suicide rates for this age group were 4th highest of 9 age groups in 2000 and rose significantly

in the years surrounding the great recession (American Foundation for Suicide Prevention, 2016). While this study does not consider age as a variable, looking at suicide rates among ages typically in the workforce, compared to those not typically in the workforce, helps to shed some light on the degree to which suicide and unemployment could be related.

This study intends to look at the suicide rate and unemployment rate over time in the U.S. The relationship between these two variables is somewhat known, but further research can help to determine what level the relationship stays consistent across time and different data sets. This will add to the current field of knowledge by reexamining this relationship.

II. LITERATURE REVIEW

In the seminal model of Hamermesh and Soss (1974), the researchers examine other models of suicide, such as a model from sociology, and use those to construct an economic model. In their theory, an individual's choice of committing suicide is based on their perception of possible utility in the remainder of their life. Essentially, an individual commits suicide when their utility of living reaches zero. This contrasts existing views that suicide was an expression of frustration, directed inward and rather, establishes suicide as a rational decision, based on analysis of the positives and negatives in life.

In 1988, Lester added to the theoretical framework of Hamermesh and Soss by looking at suicide as a rational choice based on an individual's utility. However, Lester also noted that the method of suicide can influence that choice. In Lester's research, people viewed suicide with a gun very differently than suicide with pills. If one method of suicide was impossible, people did not simply choose another method. The method was an important component

of the individual's choice. So, while the choice of committing suicide can be looked at as a utility function, the method of committing suicide is an important factor in that utility function.

Additionally, Liu (2017) used Hamermesh and Soss' utility function and related it to discouraged workers and unemployment. In Liu's model, being unemployed or discouraged in one's employment, both reduced individuals utility of life. This framework supports the idea that one gets closer to having zero utility in living when they are unfulfilled in their employment, or lack of employment. Liu and Lester's contributions show different, but important aspects of a utility model of suicide by connecting it to unemployment.

Empirical research has been conducted to further study these connections proposed in Hamermesh and Soss', Lester's, and Liu's theories. Clausen and Dunn (2012) looked at monthly, panel data on suicide and unemployment from all fifty states and the District of Columbia. They ran a fixed regression between the two for the annual values in the period of 1996-2005. They found a slight link overall between suicide and unemployment, which was stronger the longer someone had been unemployed for. This supports the existing theory in that prolonged hopelessness might decrease an individual's utility of living.

Breuer's (2015) data was similar in that it was panel data looked at annually. However, Breuer was looking at regional data in Europe at a slightly later period (1999-2010). Running a regression of suicide and unemployment across 275 regions, in 29 countries, Breuer's findings were similar to that of Clausen and Dunn. Breuer found a slight link between suicide and unemployment in general, but this link was not significant in women when he split his data up by gender. However, the link was significant in

the general population and had a stronger significance when looking only at men.

Both empirical studies found a slight link between suicide and unemployment that was more pronounced when other factors were considered. Because the significance is small, more studies would help increase the validity of the findings by confirming that the correlation is small but it is consistent across different populations. This study hopes to add to this existing field of knowledge by looking at more recent data from the last two decades to confirm that a slight correlation is present in these different populations.

III. DATA AND METHODS

The National Institute of Mental Health's data on suicide rates, measured in deaths per 100,000 people in the population, was annual from 2000-2016. There was a significant difference between suicide rates of men and women, both of which were reported, but for this study, we looked only at the average. The mean suicide rate in this period was 11.67 with the minimum level of 10.4 in 2000 and the highest level of 13.4 in 2016. Generally, suicide rates trended upwards in this period. Additionally, Statista (2018) reported data from the U.S. Department of Health and Human Services which included the years 1950, 1960, 1970, 1980, 1990, and 1995 which were included in this study.

The Federal Reserve Bank of Saint Louis reported data on unemployment from the U.S. Bureau of Labor Statistics. Unemployment was measured in the percentage of the labor force which was unemployed and was monthly from 1946-2017. In order to compare it to the available data on suicide, it was converted to annual data by averaging for that year. The period of 1999-2016 was the primary focus of this study and during that period, the highest level of

unemployment was 9.6 in 2010 and the lowest level of 4.0 in 2000. The average unemployment level in this period was 6.1 with general upward trend.

Figure 1 in the Appendix shows the trends of both data sets over time. This figure shows unemployment has cycles during this period and suicide rates do not. However, in Figure 2 we see a moderate correlation with rates of both generally rising together. This figure also shows that the data is generally grouped around the trend line and there are no significant outliers. An R2 of .07 indicates that unemployment only accounts for 7% of the variations in suicide. This is not consistent with the previous empirical research.

For this study, we will run a regression of suicide and unemployment to look at the correlation between the two variables. We will use Eviews and Excel to analyze the data and find the descriptive statistics. Unemployment is the independent variable and suicide rates is the dependent variable. A positive correlation is expected as suicide rates and unemployment are expected to rise together.

This method glimpses at the relationship between unemployment and suicide and what changes in one is accounted for by changes in the other. Having more than twenty-three data points for suicide and having them less scattered over the past seventy years would increase the statistical power of the regression and the reliability of the relationship estimated.

IV. RESULTS

The raw data was used without taking logs or one off comparisons as the study sought to find if the two had a linear relationship within the same year. The previous year's suicide rate was included as a factor. This was added to examine another potential factor for suicide to be more related to time than un-

employment. Gender was considered as a variable but after looking to see if unemployment affected one gender's suicide rate more than another, it was removed because, while suicide rates were different by gender, the changes from year to year was not significantly different. The final estimation equation was:

$$Suicide\ Rate_t = \alpha + \beta_1 Unemployment\ Rates_t$$

$$+ \beta_2 Suicide\ Rates_{t-1} + \varepsilon_t$$

As shown in Table 1 in the Appendix, Constant had a positive coefficient of 12.53 with a standard error of 0.7803. The t-statistic was 16.07 which was significant (p<.0001). This means that the y intercept of the regression line is significantly different than zero. The previous year's value for suicide was also significant (p<.0001) with a positive coefficient of 0.9454 and a standard error of 0.0702. So, past suicide rates strongly affect future suicide rates. However, unemployment's effect was not significant (p=0.8447). Its coefficient was positive 0.0178 and had a standard error of 0.0904. So while previous year's suicide rates affect future years, unemployment levels do not significantly affect unemployment rates.

The F-statistic for the regression was 68.42 which was significant (p<.0001) and its adjusted R2 was 0.9019 so the factors used in the equation account for about 90% of the variability in suicide rates. The Durbin-Watson Statistic was 1.3, which is different from 2 so there is some autocorrelation. By including the previous year's suicide rates, this is to be expected. There will be autocorrelation if we are comparing the data to previous year's suicide rates. The Jarque-Bera statistic was 10.18 (p=.006) so we reject the null of normality and so the residuals are not normally distributed. The Breusch-Pagan-Godfrey statistic was -0.0203 (p=0.2442) so we fail to reject the null of homoscedasticity and assume a constant variance in the residuals.

V. CONCLUSION

Previous studies such as Clausen and Dunn (2012), and Breuer (2015) have found correlations between suicide and unemployment. This study looked at different years than those studies, but found no significant links between suicide and unemployment. The correlations found by other studies were not very strong and so perhaps this study represents a statistical anomaly that is not representative of the whole trend, but it is also possible that those minor linkages were the ones not representative of a true linkage. Further research looking at the trends over time could solidify possible relationships between these two variables.

However, there was a strong relationship between suicide rates from year to year. This is noteworthy. As previously discussed, there are many factors that contribute to an individual's choice of completing suicide, but previous suicides and other factors shifting over time have a significant impact on suicide rates. According to the results of this study, unemployment in not a significant factor that affects national rates of suicide. Thus, if someone were trying to reduce suicide rates, the best method to do so would not be creating jobs, but rather focusing on other factors that might reduce rates for a given year, thus impacting future years. Findings of a lack of relationship still can be meaningful, in that attention can be directed to solving both societal issues, but independently of each other and not hoping for one to affect the other.

Additionally, it should be noted that a lack of correlation between suicide and unemployment does not necessarily affect whether rational choice theory is a useful tool for assessing one's propensity

for suicide. Even if economic factors are not an aspect of that choice, the choice can still be analyzed using a model of utility for living like that of Hamermesh and Soss (1974). The factors that affect those choices were not found directly in this paper, but the findings conflict with previous empirical studies, not necessarily the previous theoretical works.

APPENDIX

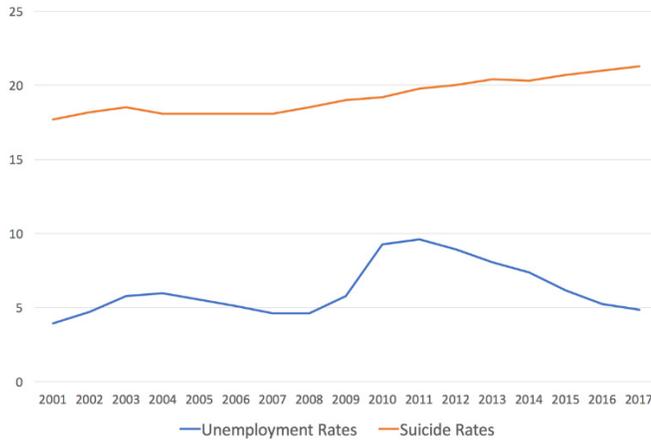### Figure 1: Suicide and Unemployment Rates Trends (2001-2017)

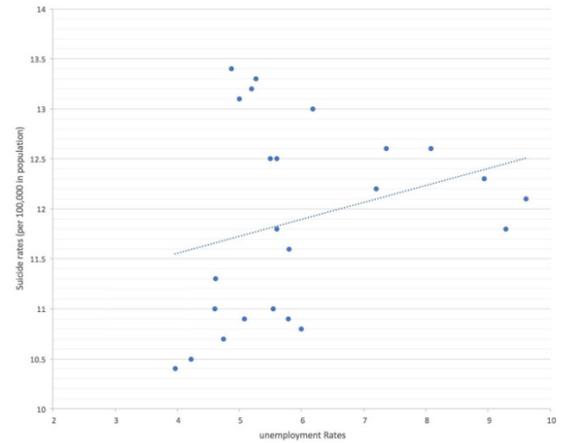### Figure 2: Suicide and Unemployment Rates Correlation (2001-2017)

Table 1: Estimation Results

Dependent Variable: Suicide Rates
Years: 1950, 1960, 1970, 1980, 1990, 1995, and 2000-2016

Unemployment	0.018 (.1986)
One Year lag on Suicide	0.9454*** (13.46)
Constant	12.55*** (16.07)
Residual diagnostics tests	
Normality	0.006[a]
Heter.	0.2442[b]

Significance at the 1% (***), 5% (**), and 10%(*) levels (t-values in parenthesis)
[a] Values of the Jarque-Bera statistical test for Normality
[b] p-values of Breusch-Pagan-Godfrey statistical test for Heteroskedasticity

REFERENCES

American Foundation for Suicide Prevention (2016) Suicide Statistics. Retrieved from https://afsp.org/about-suicide/suicide-statistics/

Breuer, C. (2015). Unemployment and Suicide Mortality: Evidence from Regional Panel Data in Europe. Health Economics, 24(8), 936–950. https://doi.org/http://onlinelibrary.wiley.com/journal/10.1002/%28ISSN%291099-1050/issues

Centers for Disease Control and Prevention. (2018) Suicide Rates Rising Across the U.S. Retrieved from https://www.cdc.gov/media/releases/2018/p0607-suicide-prevention.html

Classen, T. J., & Dunn, R. A. (2012). The Effect of Job Loss and Unemployment Duration on Suicide Risk in the United States: A New Look Using Mass-Layoffs and Unemployment Duration. Health Economics, 21(3), 338–350. https://doi.org/http://onlinelibrary.wiley.com/journal/10.1002/%28ISSN%291099-1050/issues

Cummings, Ian (13 February, 2018) The link between unemployment and suicide. World Economic Forum. Retrieved from https://www.weforum.org/agenda/2015/02/the-link-between-unemployment-and-suicide/

Federal Reserve Bank of Saint Louis. (2018) Civilian Unemployment Rate. [data file]. Retrieved from https://fred.stlouisfed.org/series/UNRATE

Hamermesh, D. S., & Soss, N. M. (1974). An Economic

Theory of Suicide. Journal of Political Economy, 82(1), 83–98. https://doi.org/http://www.journals.uchicago.edu/loi/jpehttps://www.jstor.org/stable/pdf/1830901.pdf?refreqid=excelsior%3A1814af99352613970b-50c01a3daf2329

Lester, D. (1988). Rational choice theory and suicide. Activitas Nervosa Superior, 30(4), 309–312. Retrieved from http://search.ebscohost.com.proxy.iwu.edu/login.aspx?direct=true&db=psyh&AN=1990-04869-001&site=ehost-live&scope=site

Liu, D.-C. (2017). The Discouraged Worker and Suicide in the United States. Social Indicators Research, 134(2), 771–787. Retrieved from http://search.ebscohost.com.proxy.iwu.edu/login.aspx?direct=true&db=ecn&AN=1683004&site=ehost-live&scope=site

National Institute of Mental Health. (2018) Suicide Rates. Retrieved from https://www.nimh.nih.gov/health/statistics/suicide.shtml#part_154969

Statista. (2018) Deaths by Suicide per 100,000 resident population in the U.S. from 1950-2016. Retrieved: https://www.statista.com/statistics/187465/death-rate-from-suicide-in-the-us-since-1950/