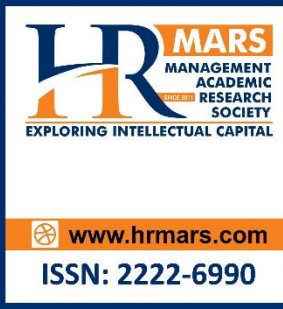




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INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES



Economic Distress and Suicide

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Abstract

This research aimed to study the nexus between the economic crises and commit suicide of the G7 countries by using a panel data approach. In this study, the variables collected are the number of suicides (SUICIDE), Gross Domestic Product per capita (PCGDP), the number of unemployed (UNEMP), the alcohol consumption per capita (ALC) and the fertility rate (FERT) were collected. This research adopted various tests such as the Ordinary Least Square (OLS) Regression model, Random-Effects model, Fixed-Effects model, Breusch-Godfrey Lagrange multiplier and Hausman test to analyse the data collected. The results of the analysis show that the UNEMP is positively correlated to the number of suicides while the FERT is negatively correlated to the number of suicides. On the other hand, the PCGDP and ALC do not affect the number of suicides significantly which implied that the PCGDP and ALC have a mix relationship with the number of suicides. In short, the UNEMP and FERT are the leading factors that affect the number of suicides in the G7 countries.

Keyword: Suicide, Economic Crisis, Unemployment, Random Effect, Fixed Effect.

Introduction

Suicide, generally defined as an action taken intentionally to harm one's life and causing one's own death. In today's world, suicide as the silent killer has always been a sensitive issue that the societies rarely or even refuse to speak in the public. However, the choice of people chose to ignore the prominent killer has contributed to the rise in the number of suicide deaths around the world. It is notable that the suicide is the second leading cause of death among the 15 to 29 years old (World Health Organization, 2017). According to the World Health Organization (WHO), it is reported that a statistical figure close to 800000 people died each year due to suicide excluding the number of suicide attempts. This figure indicated that almost one people commit suicide every 40 seconds and it is believed that the number will continuously grow in the future (World Health Organization, 2017). It is observed that the increase in the suicide rates surged to a higher level during the period of economic crisis based on the evidence concluded from certain research studies. As mentioned by

Reeves, McKee, and Stuckler (2014), there was a statistical figure of more than 10000 suicides tied to the 2008 economic recession. The economic recession implied that the consequences such as unemployment and decrease in the income level resulted from the sustainable decrease in the global economic activity surprisingly strike a harder attack on the developed nations compared to the developing nations. For instance, the suicide rate in Europe rose by 6.5% in the following year of the economic crisis despite the figure was actually showing a downward trend before the recession (Singh, 2014).

In the early years, suicide is often related to sociological determinants and there was less focus on the impact of economic perspective on suicides. Hitherto, it should not be overlooked that the economic determinants do lead to the attempt of suicide as well as the social determinants especially during the period of economic recession. Based on the study conducted by Reeves, McKee, and Stuckler (2014), the correlation between the economic recession and suicide is undeniable. During the period of economic recession, it is notable that the suicide rate is higher due to the impact of economic crisis such as loss of job and decrease in the income level. In addition, Durkheim who was commonly known as the Founding

Father of Sociology has presented the first sociological study in his work "*Le Suicide*" in the year of 1897. As stated in Durkheim's work "*Le Suicide*" (1897), one of the types of suicide which is the anomic suicide has linked suicide to disillusionment and disappointment. In the explanation of anomic suicide, Durkheim argued that the financial crises that result in the decline of economic well-being lead a person to a state of unhappiness and disappointment which contributes to the increase in the tendency of suicide attempts (Durkheim, 1897). Although the theory of anomic suicide provided a vague association between suicides and economics, the main focus of Durkheim's work was the social and moral norms which are not the major concern of the economists. It was then the economists started to investigate the relationship between the economic determinants and suicides when Hamermesh and Soss publish their work namely *An Economic Theory of Suicide* in the year 1974. As a result, most of the latter studies integrated both the socioeconomic factors in determining the real reason that lies behind the increase of the suicides.

Literature Review

Unemployment level has always been one of the major determinants used in examining the suicide mortality. As the higher unemployment level indicated the lower income level, it is presumed that the variable is positively associated with the suicide mortality. Based on the theory of anomic suicide proposed by the Durkheim (1897), it is essential to balance the needs with the means of satisfying in order to reduce the sense of unsatisfied which lead to the increase in the unhappiness level. In common, an unemployed person is assumed to have a lower or zero income level. Thus, the low-income level will tend to reduce the sense of happiness of a person leading to the increase in the tendency to commit suicide. This theory is supported by the frustration-aggression theory (Henry and Short, 1954) which denoted that the males who lost their job and source of income are likely to have a higher tendency to commit suicide. However, the impact of unemployment level on the suicide mortality is yet to be determined whether it is significant or insignificant as there were certain previous studies viewed the impact of unemployment level differs from the common social view.

Based on the previous study done by Stack (1981), he aimed to investigate the impact of the indicators of domestic integration specifically the divorce rate on the suicide rates. In his study, he collected a data set over the period of 1933 to 1970 of the United States for his time series analysis

on the relationship between suicide rate and three other variables. Methodologies such as multiple regression analysis and Durbin & Watson d statistic were used in analyzing the result. In this study, certain socioeconomic variables such as divorce rate, unemployment rate, and birth rate were taken into consideration in analyzing their impact on the suicide rate. As a conclusion, Stack concluded that higher unemployment rate leads to an increase in the suicide rate. The study done by Singh and Siahpush (2002) differed from the other researchers as they included the rural-urban continuum as one of the major variables in their study. Singh and Siahpush have done a study to examine the impact of the rural-urban gradients in United State suicide mortality and they specifically studied on the extent to which such gradients varied across time, gender and age. The data collected covered the period from 1970 to 1997 and variables such as divorce rate were also being taken into consideration as well as the unemployment rate. Multiple regression analysis and Poisson regression model were used in the analysis of data. The final results of the study concluded that the high suicide rate was attributed to the high unemployment rate.

Apart from that, alcohol consumption is one of the sociological factors that affect the suicide mortality, certain researchers have done a study on the association between the alcohol consumption and suicide mortality. As a result, most of the researchers concluded that the alcohol consumption is positively associated with the suicide mortality. A research has been done by Hintikka, Saarinen, and ViinamaEki (1999) on the suicide mortality in Finland during an economic cycle from the year 1985 to 1995. The purpose of the research is to investigate the association between suicide mortality, unemployment, rate of divorce, gross domestic product and alcohol consumption. The methodology that is being adopted in the study for further analysis was the Regression analysis using a correction for serial autocorrelation. As a result, the mean of alcohol consumption was significantly associated with the suicide mortality particular in males.

A similar research was also conducted by Pridemore (2006) in Russia to investigate the cross-sectional relationship between the alcohol consumption and suicide mortality in Russia. It is reported that, 78 regions were selected and aggregate mortality data for each region in the year 2000 were collected for further investigation. Results from Ordinary Least Square regression stated that high alcohol consumption is concluded to have positively associated with the overall suicide rates. A study was conducted by Detotto and Sterzi (2011) to examine the relationship between suicide rates and socio-economic factors in Italy. Several socioeconomic factors have been employed in the study and analysis were conducted through the random effects estimator. It is concluded that the density population and alcohol consumption have significantly impacted the suicide rates in Italy with sociological determinants were concluded to have a stronger impact on the suicide rates in Italy compared to the economic factors which resemble the result of Yamamura's research.

Besides, it is also important to note the theory of domestic integration postulated by Durkheim in the year 1966, it is notable that the fertility rate is negatively associated with the suicide mortality. According to his theory, the higher birth rate is most likely to result in a lower suicide rate due to the strengthening of the domestic integration. When the fertility rate is low, people losses the self-discipline on their respective responsibilities in which it destructs the self-interest or egoism that urge the increase in the tendency to commit suicide. Furthermore, the theory proposed in the study of Dublin and Bunzel (1933) implied that the risk of suicide in married and widowed would be reduced if there is the presence of children. As the fertility rate in a country is higher, the country's suicide rate is lower. In addition, Breed (1966) concluded that males who did not have any children are more likely to commit suicide compared to males who have children. Thus, the assumption of the presence

of children that are able to reduce the likelihood of suicide rate is supported by most the previous studies are done. It is notable that the studies included fertility rate on examining the suicide mortality yields similar results as they concluded that there was a negative relationship between the two variables. To the present days, the study by Lester (1992) on the fertility and suicide rate in United States, also support the Durkheim's theory of suicide. The higher the fertility rate the lower the suicide rate for these age groups, for both whites and non-whites, and for both men and women. However, study on suicide, social integration and fertility rate by Classen etl (2011) reported a contrast finding. The study find a positive relationship between suicide and fertility rates, in contrast to previous empirical work from other countries that has reported a strong negative relationship between fertility and suicide. This suggests that differences in the health-care system and social safety net between the United States and Europe may influence the relationship between childbirth and suicide.

A panel analysis was conducted by Milner, McClure, and Leo (2010) on the socioeconomic determinants of suicide in 35 countries. The objective of the study was to examine the nexus between the socio-economic variables and gender-specific suicide rate in 35 countries by collecting the data over the period 1980 to 2006. The divorce rate, rural population, unemployment rate, international migrants, fertility rate, females in the labour force, expenditure on health and population over 65 years old were the independent variables used in the study for the analysis done through the fixed effect regression. In conclusion, the findings showed that the reduction in suicide rates was attributed to the increased in the expenditure on health while high fertility rate was only contributed to the low suicides in males rather than females.

On the other hand, Yamamura (2010) has also done a research specifically on the impacts of socio-economic factors on suicide in Japan. The objective of the research was to examine the relationship between the selected socioeconomic determinants and gender-specified suicide in Japan. Since the study intended to examine the impact of socioeconomic determinants in both gender-specified suicide rates, a number of male suicides and female suicides were collected respectively including 47 prefectures over the period of 1988 to 2001. Apart from the socioeconomic factors which were commonly used in other research, Yamamura has included a unique Japan cultural which was the number of public baths as one of the factors that impacted the suicide rates. From the result obtained through the fixed-effects estimation, it is concluded that the sociological factors such as birth rate and a number of divorces have a stronger impact compared to the economic factors such as growth rate of real per capita income on the number of female suicides.

Materials and Methods

Data Description

The data of the number of suicides was obtained from the World Health Organization (WHO) and, the annual data of GDP per capita and the unemployment level for each country were collected from the World Bank database. Furthermore, the level of alcohol consumption and fertility rate were obtained through the OECD online database. To sum up, the independent variables that are being adopted in the study are GDP per capita, unemployment level, alcohol consumption and fertility rate while the number of suicides is the dependent variable in the study.

The relationship between the selected socioeconomic indicators (GDP per capita, unemployment level, alcohol consumption and fertility rate) and the number of suicides is expressed as below:

$$SUICI_{it} = \beta_0 + \beta_1 GDPPC_{it} + \beta_2 UNEMP_{it} + \beta_3 ALCOHOL_{it} + \beta_4 FERTILITY_{it} + \varepsilon_{it}$$

where i represents the countries (7 countries were used in the study); t represents the time; $SUICI_{it}$ represents the number of suicides; $GDPPC_{it}$ represents the Gross Domestic Product (GDP) per capita (current US\$); $UNEMP_{it}$ represents the unemployment level; $ALCOHOL_{it}$ represents the alcohol consumption (litres per capita); $FERTILITY_{it}$ represents the fertility rate. Whereas the β_0 represent the constant term; β_1 , β_2 , β_3 , and β_4 represent the regression coefficients and ε represents the error term or the stochastic term.

Results and Discussion

Pooled Ordinary Least Square (OLS) Regression

The Pooled Ordinary Least Square Regression uses the panel data ranging from 2004 to 2017 of the G7 countries for the estimation. The initial pooled effect result is presented as:

Table 1: Pooled Ordinary Least Square (OLD) Regression result

| Variable | Coefficient | Standard Error | t-Statistic | Probability |
|---------------------------|-------------|----------------|----------------------------------|-------------|
| C | -11.67294 | 5.252951 | -2.222167 | 0.0298 |
| PCGDP | 0.440541 | 0.500294 | 0.880564 | 0.3818 |
| UNEMP | 1.149805 | 0.107042 | 10.74162 | 0.0000** |
| ALC | -0.007083 | 0.038083 | -0.185993 | 0.8530 |
| FERT | -0.510221 | 0.291271 | -1/751704 | 0.0845 |
| R-squared | 0.663691 | | Probability (F-statistic) | 0.000000 |
| Adjusted R-squared | 0.642995 | | | |

As according to the result shown above, the t-statistic test for the gross domestic product per capita (PCGDP) is 0.8806 and its p-value is 0.3818. Since the p-value of PCGDP is greater than the alpha at 5% significance level, there is not enough statistical evidence to reject the null hypothesis. Thus, it is concluded that the PCGDP is insignificant at 5% significance level and thus implied that there as for this study, there is no relationship between gross domestic product per capita and suicide rate.

As for the unemployment level (UNEMP), there is enough statistical evidence to reject the null hypothesis and for UNEMP to be significant at the 5% significance level and thus there is a positive relationship between the UNEMP and SUICIDE. Meanwhile, for alcohol consumption (ALC) the p-value is 0.8530, which is greater than the alpha at 5% significance level, in which it is concluded that the ALC is insignificant at 5% significance level and the same results for fertility rate (FERT is found to be insignificant at 5% significance level and there is no relationship between the FERT and SUICIDE.

In terms of the overall F-test, the p-value of F-statistic is 0.0000, which is smaller than the alpha at 5% significance level. Thus, there is enough statistical evidence to reject the null hypothesis and it can be concluded that the coefficient is significant at 5% significance level. In addition, the adjusted R^2 shown in the result is 0.6430 which means that 64.30% variation in the number of

suicides (SUICIDE) of the G7 countries can be explained by the gross domestic product per capita, unemployment level, alcohol consumption level and fertility rate of the G7 countries.

Random-Effect Model

Table 2: Random-Effects Model result

| Variable | Coefficient | Standard Error | t-Statistic | Probability |
|--------------------|-------------|----------------|---------------------------|-------------|
| C | 7.223486 | 0.958974 | 7.532516 | 0.0000 |
| PCGDP | 0.083911 | 0.053577 | 1.566166 | 0.1222 |
| UNEMP | 0.126287 | 0.015476 | 3.969842 | 0.0002** |
| ALC | -0.021466 | 0.015476 | -1.387039 | 0.1702 |
| FERT | -0.378791 | 0.130024 | -2.913243 | 0.0049** |
| R-squared | 0.382351 | | Probability (F-statistic) | 0.000002 |
| Adjusted R-squared | 0.344342 | | | |

The results of Random Effect indicates that there are only two variables that prove to be significant at 5% level, which are unemployment (UNEMP) and Fertility rate (FERT). The result shows there is a positive relationship between UNEMP and SUICIDE and yet negative relationship between SUICIDE and FERT.

In terms of the overall F-test, the p-value of the F-statistic is 0.000002 which is smaller than the alpha at 5% significance level. Therefore, there is enough statistical evidence to reject the null hypothesis and it can be concluded that the coefficient is significant at 5% significance level. As shown in the result above, the adjusted R² is 0.3443 which implied that 34.43% variations in the number of suicides (SUICIDE) of the G7 countries can be explained by the gross domestic product per capita (PCGDP), unemployment level (UNEMP), alcohol consumption level (ALC) and fertility rate (FERT).

Breusch-Godfrey Lagrange multiplier

Table 3: Breusch-Godfrey Lagrange multiplier result

| Test Summary | Test-statistic | Probability |
|---------------|----------------|-------------|
| Breusch-Pagan | 209.6949 | 0.0000** |

Notes: ** denote as significant at 5 percent significance level.

Since there is enough statistical evidence to reject the null hypothesis as p-value is significant at 5% significance level, it is concluded that the random effects model is more preferable for this study compared to the Pooled OLS model.

Fixed Effects model

Table 4: Fixed-Effects model result

| Variable | Coefficient | Standard Error | t-Statistic | Probability |
|--------------------|-------------|----------------|---------------------------|-------------|
| C | 7.344669 | 0.907882 | 8.089893 | 0.0000 |
| PCGDP | 0.083166 | 0.053584 | 1.552071 | 0.1260 |
| UNEMP | 0.121323 | 0.031969 | 3.794988 | 0.0004** |
| ALC | -0.022970 | 0.015609 | -1.471590 | 0.1464 |
| FERT | -0.394047 | 0.131329 | -3.000461 | 0.0039** |
| R-squared | 0.997564 | | Probability (F-statistic) | 0.0000 |
| Adjusted R-squared | 0.997151 | | | |

Based on the result presented above, the t-statistic and p-value of gross domestic product per capita (PCGDP) and alcohol consumption (ALC) is greater than alpha at 5% significance level. Since there is not enough statistical evidence to reject the null hypothesis, it is concluded that the PCGDP and ALC is insignificant at 5% significance level and thus there is a mixed relationship between the PCGDP, ALC and SUICIDE.

As for the unemployment level (UNEMP), the result showed that the t-statistic of UNEMP is 3.7950 and its p-value is 0.0004. Since the p-value of UNEMP is smaller than the alpha at 5% significance level, there is enough statistical evidence to reject the null hypothesis. Thus, it is concluded that the UNEMP is significant at 5% level of significance and there is a positive relationship between the UNEMP and SUICIDE. For the fertility rate (FERT), it shows negative relationship with SUICIDE as, there is enough statistical evidence to reject the null hypothesis. The results indicates that with 1% increase in fertility rate, shall lead to reduction of 3% of suicide rate

In terms of the overall F-test, the p-value of the F-statistic is 0.0000 which is smaller than the alpha at 5% significance level. Since there is enough statistical evidence to reject the null hypothesis, it is concluded that the coefficient is significant at 5% level of significance. Meanwhile, the adjusted R-squared shown is the result above is 0.9972 which means that 99.72% variations in the number of suicide can be explained by the gross domestic product per capita (PCGDP), unemployment level (UNEMP), alcohol consumption level (ALC) and fertility rate (FERT) of the G7 countries.

Hausman Test

Table 5: Hausman Test result

| Test Summary | Chi-Square Statistic | Chi-Square degree of freedom | Probability |
|----------------------|----------------------|------------------------------|-------------|
| Cross-section random | 4.583858 | 4 | 0.3328 |

As according to the result presented above, the Chi-Square Statistic is 4.583358, and the p-value is 0.3328 which is greater than the alpha at 5% significance level. Since there is not enough statistical evidence to reject the null hypothesis, it is concluded that the random effects model is more appropriate for this study.

Conclusion

This study intended to evaluate the association between the selected socioeconomic variables and the number of suicides in the G7 countries. As according to the study, the random-effect model is more appropriate than the fixed-effect model to explain the outcome of the study.

The study shows that there is a mixed relationship between both the variables as the GDP per capita has an insignificant impact on the number of suicides. In other words, the changes in the GDP per capita do not directly contribute to the changes in the number of suicides. This was due to the G7 countries as the most advanced economy countries globally are capable of dealing with the financial crisis that weakens the overall economy. As the fluctuations in the income level have been minimized, the impact of it on the suicide decision is relatively small. Thus, the GDP per capita does not play a crucial role in contributing to the high suicides in the G7 countries.

Secondly, the unemployment is suggested to be positively associated with the number of suicides as proposed in the study. When the number of unemployed increases, the number of suicides increases as well. Based on the study of Noh (2009), unemployment affects the number of suicides significantly, especially in the high-income countries. Since the nations of high-income countries are less likely to tolerate unemployment, it leads to a higher tendency of suicides. Thus, there is a positive relationship between the unemployment and number of suicides in the G7 countries.

Besides that, the results from the random-effect model show that the alcohol consumption unexpectedly has an insignificant impact on the number of suicides in which it opposed the initial conceptual framework. Although people commonly viewed the alcohol consumption as the weapon that distorts the rational thinking and increases the suicides attempts, this study concluded that there is no relationship between the alcohol consumption and the number of suicides in the G7 countries. Some countries such as Japan, have implemented certain policies such as increasing the price of alcohol and excise tax on alcoholic beverages in order to control the overall consumption level. Results also indicates, the fertility rate is significant and negatively associated with the number of suicides in the G7 countries. In other words, the number of suicides declines as the fertility rate increases. This is due to the increase in the responsibility of having a child will tend to reduce the suicides attempts, especially in females. However, the developed countries such as the United States often has very low birth rate mostly due to the high standard of living as well as highly educated women.

Policies

As based on the results of the study, the unemployment and fertility rate are the variables that affect the number of suicides significantly in the G7 countries. In order to cope with the issue of unemployment, the government should improve the job creation and the flexibility of the labour market through the provision of employment subsidies. One of the reasons why the unemployment is high in the developed countries is mostly attributed to the restrictive labour market in which limits the ability of the firms to hire workers. As a result, firms are less likely to employ new workers and thus creating a high unemployment rate. By establishing an employment subsidy, it encourages the firms to hire those long-term unemployed instead of rejects their application for the job. This employment subsidy provides the incentives for the firms to give a job opportunity to those unemployed and boosting their confidence level in which results in the lower tendency of suicides. For instance, the government of South Korea has reduced its youth unemployment by providing cash incentives for the firms that hire the unemployed youth (Yamada, 2018). Besides that, the

government could improve the job creation through the provision of tax breaks in order to encourage the firms to set up in the depressed areas. When the firms are newly set up in the depressed areas, they need labours to facilitate the operations and thus, leading to the increase of job opportunities. However, it is necessary for the government to consider the possibility of the firms to take advantage of the employment subsidies as well as the tax breaks. On the other hand, the fertility rate in developed countries is usually low due to the high standard of living. It is suggested that the government should implement a policy to subsidize the low-income parents who have children.

With the subsidization, it can reduce the financial burden of the parents with low income to afford the cost of raising their children. However, subsidization alone is insufficient to solve the issue of low fertility rate. The working environment should be parent-friendly in order for those labours with children to reconcile their responsibilities between job and family. As a tension working environment discourage the interest of people to have children, it is necessary for the government to cooperate with the industrial firms to improve the current working environment. By establishing children day care facilities nearby the company, it eases the responsibilities of the parents so they are able to focus on their work without worrying their children. Hence, the improved fertility rate can directly lead to the decline in the suicide attempts.

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