

Tigers and tiger cubs: an analysis of suicide rates in East and Southeast Asia

A bachelor-thesis

Name: Doo-Hwan van Gennip, s3232476
Supervisor: Adrien Remund
University of Groningen
Faculty of Spatial Sciences
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Summary:

Over the past decades, numerous countries have experienced the epidemiologic transition, which, to a certain degree, has led to a global convergence of life-expectancy. One of the causes of death that has resisted improvements in health care is suicide, especially in East Asia. Countries like Japan and South Korea have very high suicide rates and for both countries the number of suicides is an urgent public health concern. At the same time, countries in East and Southeast Asia have experienced rapid economic and societal changes, which in combination with Durkheim's theses on suicide, made the region an interesting subject for this thesis. Therefore, with the help of a literature review, a descriptive data analysis and multiple linear regression analyses this thesis has formulated an answer to the following main research question:

How can differences in the epidemiology of suicide between old and new tiger economies be explained?

The literature review showed that Durkheim and other scholars have found sociological dimensions like the economy and culture to be influencing suicide rates at the macro-level. Specific variables were selected from the literature that could give indications for both dimensions: GDP per capita, unemployment rates and Hofstede's cultural values. For the quantitative analyses secondary data on suicide and data for the two sociological dimensions were collected from the World Health Organisation, the International Monetary Fund and Hofstede Insights. The data were then analysed by standardising the suicide data for the available years and running two multiple linear regression analyses to test the predictive value of each dimension.

Over the period 1995-2015 suicide rates for the eight tiger economies have developed differently, with South Korea and Taiwan both experiencing increases in their suicide rates, even though South Korea's increase was more drastic. Japan showed a stabilising trend over the same period, while rates for the other tiger economies largely remained stable. The regression analyses found that the general economic climate does not influence the suicide rates of the eight tiger economies, even though individual economic variables were significant. When cultural values were added to the regression models, GDP per capita kept its predictive power, but the predictive value of unemployment rates became significant. As for the individual cultural values, the regression analysis gave a mixed picture. Power-distance and individualism were negatively associated with suicide rates, while uncertainty avoidance was positively associated with suicide rates. Overall, both culture and the economic climate seem to be able to offer explanations for differences in suicide rates between old and new tiger economies.

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1. Introduction:

In 1971, Abdel Omran introduced his theory about the epidemiologic transition (Omran, 1971). The theory describes three ages which countries experience as they modernise and make improvements in the treatment of diseases. As a country transitions from one age to another, life-expectancy increases and the dominant cause of mortality changes. In the first age, infectious diseases are the main cause of death, but once a country enters the third age of Omran's theory this has shifted to man-made and degenerative diseases. In the decades after Omran first introduced his theory, multiple authors have suggested modifications (i.e. adding a fourth stage) to the theory in order to account for the improvements that have been made in treating man-made and degenerative diseases in the West (Rogers & Hackenberg, 1987; Vallin & Meslé, 2005). In recent decades, several countries in East and Southeast Asia have experienced the epidemiologic transition, thereby significantly closing the gap with West-European countries in terms of life-expectancy (Zhao & Kinfu, 2006; Vallin & Meslé, 2005). Most countries in East-Asia have reached the same levels of life-expectancy one currently sees in West Europe, while some, like Japan, Singapore and South-Korea, have already surpassed the West-European average (CIA World Factbook, 2017). Yet, despite the overall epidemiologic convergence, East-Asian countries like Japan and South Korea have serious problems with their suicide rates (WHO, 2018). South-Korea is perhaps the most poignant example of this development. For several years now, suicide has been one of the most urgent public health priorities for the South Korean government (Kim & Yoon, 2013) and it has been argued that the country's increase in suicide rates has made a net-negative contribution to overall life-expectancy (Yang et al., 2010; Noah et al., 2016).

Emile Durkheim (1952) ¹ has argued that suicide is not merely an individual act and that suicide rates are also influenced by broader societal factors, such as the economy and culture. Over the past decades, countries in East and Southeast Asia have experienced rapid economic development (World Bank, 1993). These countries are often called tiger or tiger cub economies with the latter referring to countries in Southeast Asia in which development started more recently. As a consequence of the rapid economic growth, these tiger economies have experienced a huge increase in their standards of living. Since suicide is rarely discussed in relation to epidemiologic theory and with the rapid economic development of the tiger economies in mind, it would be interesting both from a scientific perspective as well as from a societal perspective to explore the relation between suicide rates and broader societal forces in these countries.

The main focus of this thesis will be to investigate the epidemiology of suicide in East and Southeast Asia in relation to Durkheim's theses on suicide (1952). The epidemiology of suicide in these regions will be explored in the context of rapid economic development and alarmingly high suicide rates in countries like Japan and South Korea. This thesis will therefore answer the following research question and sub-questions:

How can differences in the epidemiology of suicide between old and new tiger economies be explained?

- *Which sociological factors influence suicide rates among populations?*
- *How have suicide rates of tiger economies developed between 1995 and 2015?*
- *To which degree have suicide rates converged between old and new tiger economies?*

The first sub-question will be answered with help of scientific literature and data analyses and will mainly focus on Durkheim's theses on suicide. The second and third sub-question will be answered with suicide data from the World Health Organisation (WHO). Together these sub-questions constitute the framework with which the main question will be answered.

The thesis is structured as follows: Chapter 2 focuses on the theoretical framework. In this chapter relevant theories will be discussed that will help in answering the main research question. Chapter 3 describes the methodology of this thesis. It explains the method with which the data was collected, how variables were chosen and it also offers reflections on data quality and ethics. The next chapter will then combine the results of the literature review and the analysis of the secondary data. Finally, chapter 5 will summarise the results and submit the thesis' limitations.

2. Theoretical framework:

2.1 Durkheim on suicide:

Emile Durkheim (1952), one of the founders of sociology, has argued that suicide is a unique cause of death and that it is a social fact. This means that, according to Durkheim, suicide is not so much an individual act, but that it is instead determined by factors in society at large. Hence, suicide can be seen as an indicator of the health of a society. Durkheim identifies three types of suicide: egoistic suicide, altruistic suicide and anomic suicide. Egoistic suicides are caused by a lack of social integration experienced by an individual. Altruistic suicides occur when a person is subject to an excess of social integration. For the third type of suicide Durkheim introduced the concept of *anomie*. With this concept he tried to explain the negative effects people seem to experience when social cohesion in a society diminishes. He argued that as a consequence of substantial societal upheaval, such as during an economic crisis or a rapid modernisation, feelings of loss may emerge among large groups of people, who are then more inclined to commit suicide.

2.2 Economic climate:

The relationship between suicide rates and the state of an economy has recently been supported by several scholars. Hodwitz & Frey (2016) found results that supported Durkheim's thesis, with suicide rates increasing following the economic crash. However, they also noted that for women suicide numbers did not decrease once the economy had stabilised. It has also been found that economic indicators seem to have a larger impact on suicide rates in Asia than in the West (Rehkopf & Buka, 2006). Nevertheless, Andrés et al. (2011) found that in Japan economic indicators like GDP per capita only had a moderate influence on suicide rates.

A specific economic variable that is often discussed in relation to suicide rates is the unemployment rate in a country. Chang et al. (2009) have argued that the rise in unemployment during and immediately after the Asian financial crisis of 1997/1998 was closely associated with the rise in the number of suicides in countries like Japan, Hong Kong & South Korea. This close connection between unemployment rates and suicide rates has also been found in South Korea by Inoue et al. (2010). Chowdhury et al. (2013) submitted that worsening employment situations during the early years of the financial crisis of 2008 and 2009 had a negative impact on public health indicators, like suicide rates. However, Chen et al. (2010) found that although suicide rates in Taiwan and Hong Kong rose, when unemployment rose in the aftermath of the Asia crisis, suicide trends cannot necessarily be explained by unemployment rates. This argument was based on the fact that when unemployment rates eventually started to decline, Taiwan's suicide rates did not decline with them. A similar outcome was found in the United States, where unemployment rates and suicide rates seemed to be unrelated (Kerr et al., 2017).

2.3 Religion:

Durkheim (1952) argued that culture, and more specifically religion, is another sociological factor that determines suicide rates. In his research Durkheim observed that Catholics were less likely than Protestants to commit suicide and that religion also had protective qualities that could improve people's emotional wellbeing and social integration. Although, Durkheim's initial findings were later challenged (i.e. Pope, 1976), Simpson & Conklin (1989) argued that when a comparison was made between Christianity and a non-Christian religion, such as Islam, Durkheim's thesis held. They found that the percentage of followers of Islam in a country had a net negative effect on suicide rates, even when control variables of modernity were taken into account. More recently, Bertolote & Fleischmann (2002) noted the differences in suicide incidence between countries with different dominant religions. They found that in countries where Islam is the dominant religious denomination, suicide rates are lowest, while rates in Buddhist countries are higher on average. In 2009, Gearing & Lizardi wrote a literature review in which they found that suicide rates vary across different religions and that religiosity is an important factor to consider. Vijayakumar et al. (2008) have discussed the relation between religion and suicide mainly in terms of sanctions. They argued that the four main religions in Asia (Islam, Hinduism,

Buddhism and Christianity) each have different rules and sanctions concerning suicide. While Islam, Buddhism and Christianity condemn suicide to varying degrees, Hinduism is less clear about the subject. The relation between Buddhism and suicide is interesting to investigate, since it is the dominant religion in South Korea and Japan, countries that both have relatively high suicide rates.

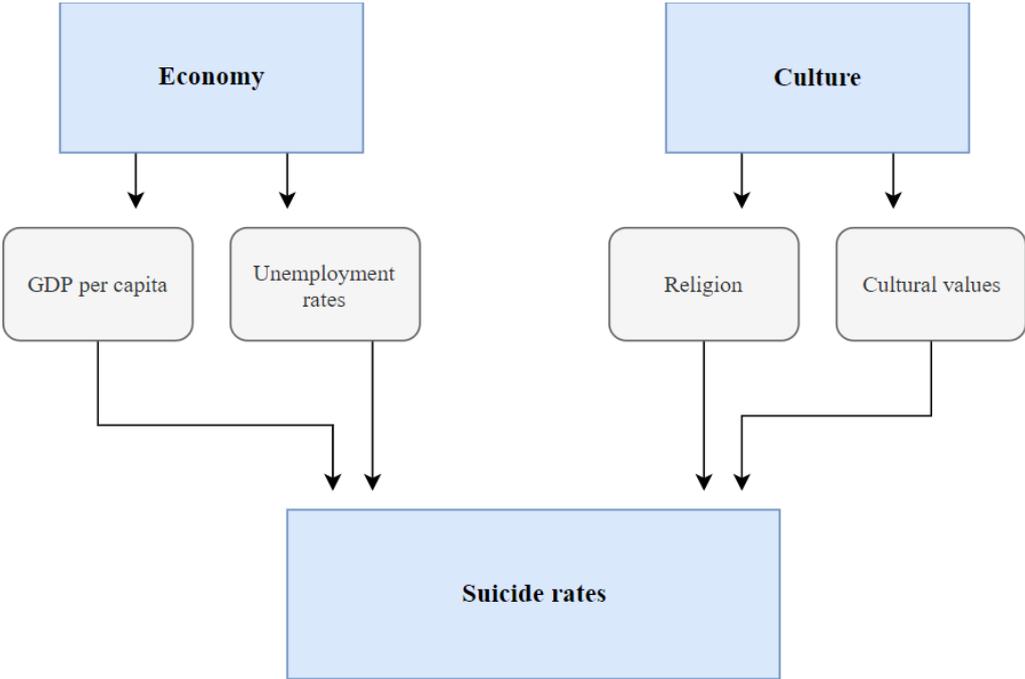
2.4 Cultural values:

Cultural factors that are non-religious have also been found to have an influence on suicide rates. Lester (2008) argued that, in general, culture influences suicide rates and that in heterogenous societies, like the United States and Australia, suicide rates in different cultural groups should not be assumed similar. According to Pridmore & Walter (2013), each culture develops a specific set of customs and traditions that include suicide practices and around which national suicide rates then vary. Moreover, a cross-national analysis of suicide rates showed that four non-religious cultural values accounted for 25% of variance between countries (Rudmin et al., 2003). In their analysis, Rudmin et al. used four cultural dimensions (power-distance, uncertainty avoidance, individualism-collectivism and masculinity-femininity) that were put forward by Hofstede in 1980, and then explored the relation between these cultural values and suicide rates.

Individualism-collectivism is perhaps the most interesting of Hofstede’s cultural dimensions to explore in relation to suicide, since it can relate to both the strength of familial ties as well as religion. Families can function as a protective factor against suicide (Laidler, 1998) and in Asia the Confucian view of the extended family strongly emphasizes collectivism and cohesion (Mingzhao et al., 1992). Perhaps, counterintuitively, some scholars have also argued that the extended family system reinforces suicide rates among young women (Phillips et al., 2002). This observation is mainly attributed to the low position young women have in the family hierarchy (Zhang et al., 2010) and the preclusion the family system offers them (Chen et al., 2012). Eckersley & Dear (2002) found that there was a significant correlation between youth suicide and individualism. They stated that the association between the two factors could be considered a sign of the failure of Western societies to provide its youth with feelings of identity and attachment.

2.5 Conceptual model:

Figure 1: Conceptual model



The conceptual model (see figure 1 above) illustrates the relationship between suicide rates and two sociological dimensions, as put forward by Durkheim (1952) and others. On the left hand side, the relationship between the economic situation in a country and suicide rates is shown, while on the right hand side the relation between culture and suicide rates is visualised. The relationship between these dimensions and suicide rates have later been tested with the help of more specific variables. For the economic dimension, these indicators have generally been GDP per capita and unemployment rates (Chowdhury et al. 2013). While for the cultural dimension, religion (Simpson & Conklin, 1989) and cultural values (Rudmin et al. 2003) are deemed influential factors.

3. Methodology:

For the purpose of the analysis, data on several countries in East and Southeast Asia were collected for the period between 1995 and 2015. This particular period was chosen to explore recent trends in suicide rates and to include the two most recent periods of serious economic upheaval, namely the Asia crisis that lasted from 1997-1998 and the global financial crisis of 2008. Both economic crises can be viewed as decent reference points with which to test Durkheim's (1952) thesis that economic and societal upheaval lead to higher suicide rates. The following countries were included in the analysis: Japan, South Korea, Hong Kong, Singapore and Taiwan, often considered 'old' tiger economies, as well as Malaysia, Thailand and the Philippines, where economic development started more recently.

3.1 Data collection and variables:

- *Age-standardised suicide rates:*

Age-standardised suicide rates are the total number of suicides in a country standardised for differences in population size and age-structure. The data that was used to calculate these standardised rates were collected from the World Health Organisation's mortality database (WHO, 2019) and the United Nation Population Division (2017). All forms of intentional self-harm were included when calculating the country specific rates. Based on the International Statistical Classification of Diseases and Related Health Problems (ICD) the following disease codes were therefore included in the analysis: E950 – E959 for ICD – 9 and X60 – X84 for ICD – 10. The use of two different classification systems can be viewed as problematic, but Griffiths & Brock (2003) have argued that differences between the two coding systems are minimal.

Table 1: Availability of suicide data from WHO:

Country	Years available	ICD
South Korea	1995 – 2015	ICD – 10
Singapore	1995 – 2015	ICD – 9 ('95 – '11), ICD – 10 ('12 – '15)
Hong Kong	1996 – 2015	ICD – 9 ('95 – '00), ICD – 10 ('01 – '15)
Taiwan	-	-
Malaysia	2000 – 2014	ICD - 10
Philippines	1995 - 2003 , 2006 - 2011	ICD – 9 ('95 – '98), ICD – 10 ('99 – '11)
Thailand	1995 - 2000 , 2002 - 2015	ICD – 10

The World Health Organisation does not have suicide data for Taiwan for the period 1995 – 2015 (see table 1). This issue was solved by using age-standardised suicide rates computed by Taiwanese suicidologists (Liao et al., 2015; Liao et al., 2017). These rates were standardised using the WHO 2000 standard population. Concerning the Philippines, Malaysia and Thailand it must be noted that suicide data for these countries do not cover the entire period between 1995 and 2015 (see table 1). Nonetheless, the data that is available for these countries is mostly chronological and for each of the three countries only a limited number of years is missing, thereby still making it worthwhile to include them in the analysis. Countries like Indonesia and Vietnam that could also have been included in the analysis were left out due to the fragmented availability of suicide data for these countries.

- *GDP per capita (PPP):*

GDP per capita (PPP) is an indicator of economic growth that has been standardised in order to account for differences in population size (per capita) and differences in price levels (PPP, purchasing power parities). It is one of the most often used indicators of economic development, since it measures a country's total economic output over a year. The data for this variable was retrieved from the databases of the International Monetary Fund (2019a), since this database contains data on all countries that were analysed and covered the entire period from 1995 – 2015.

- *Unemployment rates:*

Unemployment rates represent the percentage of the total working population that is unemployed. The number of unemployed people in a country is a good predictor of the state of an

economy. Unemployment rates have been found to correlate strongly with the economic climate and can be expected to increase in times of an economic downturn (Okun, 1962). Moreover, unemployment generates severe and concrete feelings of loss (Hiswåls et al., 2017), making it a useful addition to the research especially in relation to Durkheimian notions like anomie. The data was retrieved from the databases of the International Monetary Fund (2019b). The main reason for this is that the IMF's database contains data unemployment data for all countries in the analysis and the data cover the entire period from 1995 – 2015, with the exception of Thailand.

- Hofstede's cultural dimensions:

In 1980, Geert Hofstede introduced his cultural dimensions model. Based on surveys he identified four work-related cultural dimensions. These dimensions are individualism-collectivism, masculinity-femininity, uncertainty avoidance and power-distance. Countries are rated on a scale of 1 to 100 for each dimension. This indexation makes it possible to make cross-national comparisons. Since culture is difficult to express in numbers or rates, Hofstede's dimensions are probably the most comprehensive alternative to do a statistical analysis of the influence of cultural values on suicide rates. The data for the four cultural dimensions were retrieved from Hofstede Insights (2019) and the book *Cultures & Organizations* (Hofstede et al., 2010), which is an updated and more elaborate version of Hofstede's initial findings.

3.2 Analysis:

For this thesis, a descriptive analysis of suicide rates was performed first in order to find out how suicide rates have recently developed in East and Southeast Asia and to which degree suicide epidemiology has converged between old and new tiger economies. The descriptive analysis entailed the computation of the age-standardised suicide rates for each of the eight tiger economies over the period 1995-2015. The raw suicide data that were collected from the WHO were standardised with the help of UN population data and the 2000 WHO standard population.

Then, in order to explore the predictive power of sociological dimensions like culture and the economic climate on suicide rates, two multiple linear regression models were run with SPSS. The dataset that was used contained 152 cases. Each individual case represented one of the eight countries for one specific year between 1995 and 2015. With the exception of 'Unemployment rates', the beforementioned variables covered all 152 cases. Data on unemployment rates were able to cover 146 cases, with six years of unemployment data missing for Thailand. In each of the regression models age-standardised suicide rates served as the response variable, while the other variables functioned as explanatory variables. The first model exclusively tested the relationship between the state of the economy and suicide rates. For the second regression model, the cultural value scores were added to test the predictive power of culture. In order to compare their relative quality, both the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) were computed for both models (Akaike, 1977; Schwarz, 1978).

A test analysis found that adding country dummies, which would have been able account for differences within the eight tiger economies, led to multicollinearity and they were therefore all excluded from analysis (see Appendix A). Furthermore, a high degree of multicollinearity was found for the variables 'individualism-collectivism' and 'masculinity-femininity' (see Appendix B). Based on literature (Laidler, 1998; Eckersley & Dear, 2002) the variable individualism-collectivism was of specific value for the analysis, since it relates to social integration and religion. Therefore, the variable 'masculinity-femininity' was excluded instead.

3.3 Data quality:

For its analyses, this thesis has completely relied on secondary data. Although this choice of research method has its merits, it also requires the researcher to critically approach and review the collected data (Punch, 2014). Therefore, the following paragraphs offer insight and reflection on the original data collection and the general reliability of the data that was used.

- Suicide data:

The collection of WHO mortality data, which includes data on suicides, works as follows: most countries register the number and causes of deaths in their country's civil registration system on

the national or local level. Then each year the WHO issues requests for mortality data, after which the national authorities, mostly ministries of Health or statistical offices, submit their data to the WHO. The data provided to WHO are not modified to counter underreporting, but if it is necessary, classification is harmonised with ICD – 10 as much as possible.

Nowadays most developed countries are able to document the number of suicides in their country relatively well, although the role of intent still complicates the reliability of the data (Värnik, 2012). Chan et al. (2015) have for instance argued that the rise in South Korea's suicide rates had long been masked by a high number of misclassifications. In order to address the issue of data quality, the WHO created a 4-level rating system that assesses the reliability of mortality data provided by each country (Mathers, 2005). Based on this rating system suicide data from South Korea, Japan, Hong Kong, Singapore and Malaysia can be considered reliable (Hendin et al., 2008). Suicide data from Thailand and the Philippines are considered to be of lower quality (Hendin et al. , 2008; Redaniel et al., 2011), while mortality data from Taiwan are deemed fair, although quality could still be improved (Lu et al., 2006).

- Economic data:

The economic data on unemployment rates and GDP per capita provided by the IMF are maintained by the IMF's Research department and regional departments. The data are mainly provided by the national statistical bureaus, ministries of finance and central banks. For the countries in the analysis, the national statistical offices are the main providers of the data. The IMF, in cooperation with other international organisations, tries to harmonise the data in order to produce reliable and comparable economic data.

- Cultural data:

The data behind Hofstede's cultural dimensions is based on surveys conducted among 88000 employees of IBM in 66 different countries from 1967 – 1973. Based on the results from these surveys, Hofstede aggregated four dimensions, which he believed were able to describe the differences in cultural values across countries. In subsequent years, the database has grown in size with the inclusion of more countries and in 2010 Hofstede et al. published a book that tried to integrate new data into the old dataset to produce an up-to-date dataset for 76 countries. Furthermore, in the same book Hofstede et al. (2010) elaborate on the definitions of the different cultural dimensions.

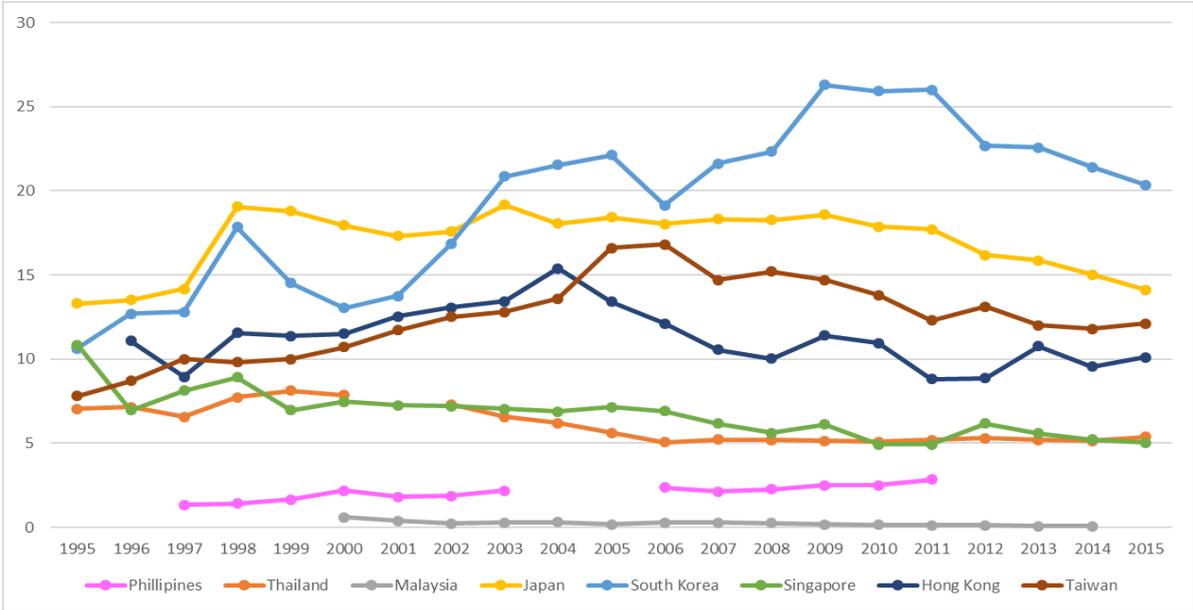
3.4 Ethical considerations:

Performing research in an ethical way is important to protect both respondents and the integrity of the scientific community. For this thesis, there are virtually no ethical considerations to take into account. The fact that this thesis relies completely on data collected at the macro-level completely nullifies the risk of individual respondents being hurt. Moreover, the databases that were accessed for the analysis are freely accessible to anyone.

4: Results:

4.1 Descriptive analysis:

Figure 2: Age-standardised suicide rates (per 100000 people)



Sources: World Health Organization (2019), UN Population Division (2017) & Liao et al. (2015, 2017)

Over the period 1995-2015, suicide rates for the eight countries have fluctuated to differing degrees and developed in different directions (see Figure 1). South Korea seems to have experienced the most drastic change in suicide rates. Over the course of a decade, suicide rates in South Korea more than doubled, with rates currently still being significantly higher than for the other countries. Although Japan and Singapore had the highest suicide rates in 1995, both have shown stabilising or decreasing trends, with Singapore having one of the lowest rates by 2015 along with Thailand. Taiwan has seen an increase in its suicide rates, but not as drastically as South Korea. Hong Kong’s suicide rates have remained virtually stable, even though the country experienced an upward trend in the late 1990’s and the early 2000’s. Additionally, increases in suicide rates can be distinguished for South Korea, Japan, Hong Kong and Singapore in the periods around 1997-1998 and/or 2008-2009. These increases coincide with the Asia crisis and the global financial crisis. This observation could hint at the impact the economic climate has on suicide rates, as has been argued by others in the past (Chang et al., 2009; Inoue et al., 2010; Hodwitz & Frey, 2016). Overall, the suicide rates of the five tiger economies and the three tiger cub economies have shown no signs of converging based on figure 1. Suicide rates for Thailand, the Philippines and Malaysia have remained consistently lower, while rates for South Korea, and to a lesser degree Japan, have increased or remained high.

Figure 1 also shows that suicide rates in the Philippines and Malaysia are substantially lower than for the other countries, with Malaysia’s suicide rates hovering around zero. One possible explanation for this observation could be religion. The dominant religions of both Malaysia and the Philippines, Islam and Roman- Catholicism, generally take non-accepting or even restrictive stances towards suicide (Vijayakumar et al., 2008). This could make devout adherents of these religions less likely to commit suicide (Gearing & Lizardi, 2009). Moreover, religion also allows its adherents to build up a support network within their congregations that can help protect them against suicidal inclinations (Koenig et al., 2001). A second explanation could be that suicide data for both countries are subject to misclassification or underreporting, even though Malaysia’s general mortality data is considered reliable (Hendin et al., 2008). Some have argued that the abovementioned religious stances towards suicide heavily stigmatise the subject, which in turn leads to a higher occurrence of misclassifications of suicides (Birt et al., 2003; Lester, 2006).

4.2 Inferential analysis:

4.2.1. Economy and suicide rates:

Table 1: Regression model 1: Relationship between suicide rates and the economy

<i>Variable</i>	<i>B</i>	<i>t</i>	<i>Sig.</i>
(Constant)		4.426	.000
GDP per capita (PPP) in \$	7.632E-5	2.375	.019
Unemployment rate in %	.115	.426	.671

The results of the first regression model seem to suggest that Durkheim's thesis that there is a relationship between the state of an economy and suicide rates is incorrect, since the overall regression model is not significant ($p=0.058$; adjusted $R^2=0.026$, see Appendix C). When it comes to the two specific variables used to represent the economic climate, only GDP per capita is significant at a 95% confidence level (see Table 1). At first sight, this result seems counterintuitive, as one would expect suicide rates to decrease when the economic climate is improving and incomes are going up. Yet, there has long been ambiguity about whether incomes and suicide rates are positively or negatively related. Durkheim (1952) has argued that (rapid) increases in incomes lead to a lower degree of social integration, which may in turn lead to an increase in the number of suicides. This line of reasoning has been supported by the findings of Lester (1996) and Andrés (2005) and corresponds with the results of the first regression model. Those who have argued that income and suicide rates are negatively correlated often do so in relation to Hamermesh & Soss's (1974) economic model on suicide. They argue that higher incomes increase people's life utility, making them less likely to commit suicide. Chen et al. (2009) have found evidence to support this negative relationship between income and suicide rates.

When it comes to unemployment rates, the regression model shows that there is no significant relationship between unemployment and suicide rates. This result is not in line with findings by other researchers who have explored this relationship. Several scholars have found significant correlations between unemployment rates and suicide rates (Chang et al., 2009; Inoue et al., 2010; Chowdhury et al., 2013). Possible explanations for this deviating result could be the relatively small size of the sample or the fact that no distinctions were made based on gender. Several scholars have, for example, found that unemployment rates are a significant predictor variable for male suicide rates, while they are insignificant for female suicide rates (Chuanc & Huang, 1997; Neumayer, 2003).

4.2.2. Economy, culture and suicide rates:

Table 2: Regression model 2: Relationship between suicide rates, the economy and cultural values

<i>Variable</i>	<i>B</i>	<i>t</i>	<i>Sig.</i>
(Constant)		4.179	.010
GDP per capita (PPP) in \$.000	5.823	.000
Unemployment rate in %	.757	4.993	.000
Power-distance	-.219	-6.787	.000
Individualism-collectivism	-.072	-2.078	.040
Uncertainty avoidance	.116	6.273	.000

4.2.2.1 Unemployment rates and GDP per capita:

The results of the second regression model are illustrated in table 2 above. The overall model is significant ($p=0.000$; adjusted $R^2=0.746$, see Appendix C) and the addition of cultural variables to the model has increased its quality. For the first model the AIC score was 549,382 while the BIC score was 558,333. However, for the second model both scores had fallen to 355,974 and 373,876 respectively (see Appendix C). Compared to the first regression model the predictive power of the

economic variables changed to certain degree. GDP per capita remained positively associated with suicide rates, while unemployment rates became a significant predictor variable in the new model. More precisely, if the unemployment rate in one of the tiger economies would increase with one percentage point, this would lead to a 0.757 increase in the level of standardised suicide rates. This result corresponds with findings by other empirical research and seems to support Durkheim's thesis (1952) that in times of economic upheaval suicide rates will increase as well. Unemployment rates often indicate economic uncertainty and a loss of opportunity. This may in turn lead people to become desperate about their future and commit suicide (Andrés et al., 2011).

4.2.2.2 Power-distance, uncertainty avoidance and individualism:

The three cultural values that were added to the second regression model each have a significant predictive value (see Table 2). According to the regression model, when the perceived power-distances in the eight tiger economies become larger, suicide rates are expected to become lower. This negative association between power-distance and suicide rates corresponds with findings of Lester (2002) and Rudmin et al. (2003). Hofstede et al. (2010) define power-distance as the degree to which people in organisations and institutions expect and accept that there is an unequal power distribution. Rudmin et al. (2003) have hypothesised that a broad acceptance of unequal social relations or a delegation of responsibilities to managers and supervisors might provide individuals with a certain degree of protection against suicidal inclinations, since it can relieve pressure. They also argued that the reverse argument could be made and that in countries where power-distances are smaller people will feel a greater sense of empowerment, making them more likely to engage in forms of intentional self-harm.

Another cultural value that was found to be significantly associated with suicide rates was uncertainty avoidance. Uncertainty avoidance is defined as the extent to which people view the ambiguous or the unknown as a threat (Hofstede et al., 2010). Based on the analysis, the relationship between the two variables works as follows: If the uncertainty avoidance score for a tiger economy increases with 1, this would lead to a 0.116 increase in the level of standardised suicide rates per 100000 people. The positive correlation found in the analysis does not correspond with the findings of Lenzi et al. (2012) whose analysis found the correlation between uncertainty avoidance and suicide rates not to be significant. Some have argued that that a positive correlation between suicide rates and uncertainty avoidance can be explained by viewing life as full of uncertainties and risks. Consequently, people who wish to avoid uncertainty may consider death as the ultimate escape from the risks of life, thereby making them more inclined to commit suicide (Rudmin et al., 2003).

Perhaps the most interesting result of the second regression model is the fact that individualism-collectivism is a significant negative predictor variable. In 2010, Hofstede et al. argued that a high degree of individualism in a country translates into a society in which individuals are expected to look after themselves and in which social ties are loose. In other words, one would expect suicide rates to be positively associated with individualism, especially since it is so closely related to the Durkheimian (1952) notions of social integration and egoistic suicide. Other empirical research has also found a significant positive association between individualism and suicide rates (Rudmin et al., 2003; Lenzi et al., 2012; Yip et al., 2015). One possible explanation for this deviating result could be the nature of the Confucian family system, often found in Asia. The Confucian view of familial relations emphasises collectivism (Slote & De Vos, 1998), which could cushion the effects of individualism associated with economic development. Another explanation could be the fact that in the analysis no distinctions were made based on sex and age. Rudmin et al. (2003) found that suicide rates among young women were negatively correlated with individualism. Furthermore, when one considers individualism-collectivism to be a proxy of the protective role of religion, the result of the analysis may indicate that the collectivism often associated with religion is indeed capable of lowering suicide rates in the tiger economies, like others have argued in the past (Koenig et al., 2001; Redaniel et al., 2011).

5. Conclusion:

This thesis has shown that suicide rates in East and Southeast Asia have developed in different directions over the period 1995-2015. South Korea seems to have experienced the most drastic change in suicide rates over the twenty year period, since its suicide rates have more than doubled. Taiwan has also experienced an increase in suicide rates, although not as fast or as profound as in South Korea. Japan, which had the highest suicide rate in 1995, has been surpassed by South Korea and has shown a stabilising trend. Singapore's suicide rates have fallen and are now at the same level as Thailand's suicide rates, which have remained stable between 1995 and 2015. Hong Kong's suicide rates initially increased in the early 2000's but have since then declined and stabilised. Suicide rates for the Philippines and Malaysia have remained stable, although their rates have been persistently lower compared to the other tiger economies. Finally, the suicide rates of these tiger economies have shown no signs of converging, with South Korea, Malaysia and the Philippines persistently experiencing higher and lower rates respectively.

When it comes to sociological factors that influence suicide rates among populations Durkheim's theses on suicide (1952) have been relevant for many years. The economic climate, religion and cultural values have each been found to have an influence on suicide rates based on variables like unemployment rates (Chang et al., 2009; Inoue et al., 2010), GDP per capita (Andrés et al., 2011) and cultural values (Hofstede, 1980; Rudmin et al., 2003). In the descriptive analysis of suicide rates, several tiger economies showed increases in their suicide rates in times of an economic crisis, hinting at the possible influence the state of an economy has on suicide rates. With the help of regression analyses it was found that for the eight tiger economies economic variables as well as cultural variables had a significant influence on suicide rates between 1995 and 2015. GDP per capita was found to have significant predictive power in both models. Unemployment rates were positively associated with suicide rates when cultural values were added. Power-distance and Individualism were shown to be negatively associated with suicide rates, while for uncertainty avoidance a positive association was found. These findings are generally in line with existing literature (Rudmin et al., 2003; Lenzi et al., 2012) and indicate the possible influence culture has on suicide rates.

5.1 Limitations

Although, Durkheim identified religion as an important factor influencing suicide rates, a direct variable testing this relationship was not included in this thesis. One of the ways in which the predictive power of religion has been tested in the past was by testing the relationship between suicide rates and the percentage of adherents of a certain religion per country (Simpson & Conklin, 1989). Due to the limited free availability of comprehensive data on religious adherents per country, this test could not be emulated in this thesis. Instead, one of Hofstede's cultural dimensions was used as a proxy in the interpretation of the results. The variable that relates to individualism relates to aspects of religion and cultural values that have been found to be influential when it comes to explaining suicide rates (Durkheim, 1952; Laidler, 1998).

As alluded to in the explanation of the methodology, Hofstede's cultural dimensions provide perhaps one of the few possibilities to statistically test the relationship between culture and suicide rates. Nevertheless, using Hofstede's cultural dimensions also has its limitations. A country's scores are not adjusted each year. In fact, the first large update of the scores took place in 2010, thirty years after the publication of the initial scores. This makes the cultural dimensions scores static variables, that are probably not able to completely catch the changes in culture experienced in some tiger economies over the past decade.

Finally, the use of unemployment rates can also be considered problematic to a certain degree. The main problem with unemployment rates revolves around the exact definition of the term 'working population'. For countries in Southeast Asia it might, therefore, be interesting to take into account the size of the informal sector of the economy when analysing unemployment.

Notes:

¹ The original version of Durkheim's work on suicide was published in 1897.

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Appendices:

Appendix A | Test analysis 1:

Model	Variables Entered	Variables Removed	Method
1	PHI, MAL, THA, HON, JAP, KOR, SIN, GDPCAP, UNERAT ^b	.	Enter

a. Dependent Variable: SUIRAT

b. Tolerance = ,000 limit reached.

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	VIF
		B	Std. Error	Beta				
1	(Constant)	9,135	1,250		7,310	,000		
	GDPCAP	3,113E-5	,000	,084	1,508	,134	,259	3,865
	UNERAT	,554	,188	,179	2,942	,004	,218	4,579
	KOR	7,385	,737	,388	10,022	,000	,539	1,856
	JAP	4,512	,711	,237	6,345	,000	,579	1,728
	HON	-1,617	,747	-,083	-2,164	,032	,546	1,832
	SIN	-5,498	,898	-,289	-6,124	,000	,363	2,754
	MAL	-11,303	,849	-,514	-13,314	,000	,543	1,840
	THA	-4,372	,995	-,225	-4,393	,000	,308	3,249
	PHI	-12,293	1,235	-,524	-9,955	,000	,292	3,423

Excluded Variables

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics	
						Tolerance	VIF
1	TAI	.b	.	.	.	-,015	-67,387
	POD	.b	.	.	.	,000	-3104,332
	IND	.b	.	.	.	,000	-3712,181
	MAS	.b	.	.	.	-7,168E-5	-13950,695
	UAV	.b	.	.	.	-6,320E-5	-15823,655

Appendix B | Test analysis 2:

		Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	VIF
		B	Std. Error	Beta				
1	(Constant)	7,543	1,704		4,426	,000		
	GDPCAP	7,632E-5	,000	,207	2,375	,019	,887	1,128
	UNERAT	,115	,269	,037	,426	,671	,887	1,128
2	(Constant)	12,592	3,445		3,655	,000		
	GDPCAP	,000	,000	,291	3,943	,000	,317	3,156
	UNERAT	,586	,182	,189	3,219	,002	,500	1,999
	POD	-,196	,035	-,438	-5,633	,000	,286	3,494
	IND	-,332	,159	-,474	-2,085	,039	,033	29,878
	MAS	,141	,084	,398	1,674	,096	,031	32,626
	UAV	,121	,019	,518	,518	,000	,272	3,683

Appendix C | Regression models:

Model Summary (Adjusted)						
Model	R	R Square	Adjusted R square	Sig.	AIC	BIC
1	,197	,039	,026	,058	549,382	558,333
2	,869	,755	,746	,000	355,974	373,876

		Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	VIF
		B	Std. Error	Beta				
1	(Constant)	7,543	1,704		4,426	,000		
	GDPCAP	7,632E-5	,000	,207	2,375	,019	,887	1,128
	UNERAT	,115	,269	,037	,426	,671	,887	1,128
2	(Constant)	14,031	3,358		4,179	,000		
	GDPCAP	,000	,000	,360	5,823	,000	,458	2,182
	UNERAT	,757	,152	,245	4,993	,000	,730	1,369
	POD	-,219	,032	-,489	-6,787	,000	,338	2,960
	IND	-,072	,035	-,102	-2,078	,040	,721	1,387
	UAV	,116	,019	,499	6,273	,000	,277	3,606