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Social Cohesion and Suicide¹

Testing Durkheim's conjecture

Abstract

This thesis investigates the relationship between suicide rates and social cohesion at a cross-country level. Social cohesion is defined as heterogeneity in preferences and measured as the standard deviation in multiple choice questions from the World Value Survey. Higher heterogeneity in preferences leads to a higher standard deviation which indicates a lower level of social cohesion. According to Durkheim, there is a U-shaped relationship between suicide rates and social cohesion. Consequently, suicide rates increase with both high and low levels of social cohesion. In order to test for this, I use both a linear and non-linear model with three specifications each for regression analysis. Control variables are gdp per capita, fraction of the population over the age of 65, unemployment rate, fertility rate and the Gini coefficient. Data for males and females are examined separately. The linear model seems to fit the data the best and results show a slight indication of increased suicide rates for stronger social cohesion.

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1 Introduction

Suicide constitutes a severe health problem in the world today. According to the WHO, approximately one million people died from suicide in the year 2000 and the trend is increasing. In the last 45 years, the rate has risen by 60 % worldwide (WHO, 2006). This might be due to improved methods of collecting data, but this fact doesn't necessarily reduce the problem, on the contrary; there might still be lots of people committing suicide that we never learn about.

Apart from the obvious humane reasons for studying and trying to understand suicidal behaviour better, there is also an economic viewpoint to it. Suicides and suicidal attempts imply considerable costs for society. The Swedish Rescue Services Agency calculated the yearly costs for suicides and suicidal attempts in Sweden in the early 2000s to amount to 5.5 billion SEK, which equals 0.2 % of total GDP (Räddningsverket, 2004).² However, it is also possible to claim that suicide to some extent is beneficial to both the individual and society, since some people who commit suicide constitute a financial burden to society, and maybe will not be better off with treatment, but see suicide as the only solution.

Suicide has been a topic of study for a long time in especially psychology. Sociological and economic studies of suicide also exist and maybe the most significant contribution from these disciplines is the study "Le suicide" by Emile Durkheim, first published in 1897. Durkheim explains cross-country variation in suicide with different levels of social cohesion, stating that extreme levels of social cohesion, strong or weak, will lead to higher suicide rates. According to Durkheim, there is thus a U-shaped relationship between suicide and social cohesion.

In this thesis I study the relationship between suicide and social cohesion. More specifically I investigate if differences in opinions within countries have any impact on suicide rates. This has been a matter for discussion ever since "Le suicide" was published, but so far it hasn't been empirically tested.³ I measure social cohesion at the national level by the standard deviation of responses to multiple-choice questions in the World Values Survey (WVS), i.e. as heterogeneity in preferences. Using this definition means that a lower value for the social cohesion variable actually implies stronger social cohesion and vice versa. This is due to the fact that a high level of consensus (which in this study denotes strong social cohesion) results in a low standard deviation, and this is defined as the social cohesion variable.

² The majority of this number is related to indirect costs such as production losses (these are divided into production losses because of death, production losses because of invalidity and temporary production losses), while a minority is due to direct costs, mainly medical care.

³ According to what the author knows.

The results of the study are not entirely clear. There is some evidence of a U-shaped relationship for females the way Durkheim described it, but for men this relationship is actually opposite to what Durkheim predicted and also fairly weak. A linear regression model provides some evidence for a positive correlation between social cohesion and suicide rates for both sexes.

The outline of the study is as follows; first, I give an account of relevant economic and sociological research on suicide. Thereafter, I describe the data and the regression models to be estimated. After deciding on which model seems to fit the data best, I carry out several robustness checks, as controlling for geographical regions, religious and cultural traits as well as dubious data. Finally, I discuss the findings.

2 Aim

The aim of this thesis is to increase the understanding of suicide as a social phenomenon by studying the relationship between suicide rates and social cohesion at a cross-country level. The results will then be compared to Durkheim's conjecture saying that extreme social cohesion, both strong and weak, leads to higher suicide rates.

3 Previous research

The correlation between suicide rates and different economical and sociological factors were thoroughly studied by Durkheim (1897). Durkheim categorized suicide into three major types: egoistic suicide, altruistic suicide and anomic suicide. In short, egoistic suicide occurs when an individual is very loosely integrated in society, giving him the feeling that there are very few things connecting him to the world and the people around him. In moments of despair, this individual considers suicide a reasonable solution to his problems. Thus, very weak social cohesion would result in high suicide rates. The opposite is the altruistic suicide, provoked by a feeling of very strong belonging to a group or a society. At a certain point, when an individual can no longer contribute to the well-being of this group and is perceived as a burden rather than an asset, the ultimate solution is suicide. Thus, very strong social cohesion also results in higher suicide rates. The last category, the anomic suicide, occurs when big social and/or economic changes take place. These can be either positive or negative; the decisive factor is rapid change, which leads to weakened social ties provoking an increase in suicide rates. Even though the three different categories differ a lot (egoistic and altruistic suicide are antonyms, whereas anomic suicide is a type of egoistic suicide), they all have one thing in common, namely the influence of social

cohesion. Durkheim never defines or gives any empirical evidence for what social cohesion really is, but rather concludes from his other empirical research that it exists and heavily influences the behaviour of individuals within a society.

Although Durkheim mentioned and discussed economic factors, he focused mainly on sociological factors. In 1974, Hamermesh and Soss analyzed the first regression model of suicide based on solely economical factors. The hypothesis is best described by the quote “an individual kills himself when the total discounted lifetime utility remaining to him reaches zero” (p. 85). Their regression model contains unemployment, income and age as explanatory variables. The interpretation of the correlation between the different independent variables and suicide is pretty straightforward; unemployment reduces income and therefore utility, age reduces the remaining lifetime and hence utility whereas rising income increases utility. Empirically, they found unemployment and age to be positively correlated with suicide rates, whereas income was negatively correlated with suicide rates. It should be stressed that the authors never claimed that economic factors are the only determinants of suicide rates.

Later research has showed that unemployment is normally associated with higher suicide rates (see for example Huang, 1996; Brainerd, 2001; Blakely et al, 2006). Other studies have found unemployment to be negatively correlated with suicide rates for women, but positively correlated with suicide rates for men (Berk et al, 2005). Blakely et al (2003) give a somewhat more complex picture of the relationship between unemployment and suicide. Unemployment can be related to suicide in three ways. First, unemployment leads to a more stressful life per se which directly increases the risk for suicide. Second, there can be indirect causes, such as unemployment leading to lowered income or mental illnesses which increase the risk for suicide. Third, there might be confounding factors predicting both unemployment and elevated suicide rates, such as mental disorders.

Suicide is almost always more common among older people. This can be explained through economic factors; older people normally have lower expected income in the future (Jungeilges and Kirchgässner, 2002) and higher maintenance costs of daily life and health (Hamermesh and Soss, 1974). Certainly, other factors should also be considered – such as the loss of a spouse or friends, escalating physical and mental problems and less life time remaining.

Wealth was not considered by Durkheim as necessarily being negatively correlated with suicide rates. On the contrary, he claimed that “you can actually state, that poverty to some extent reduces the risk for suicide”⁴ (Durkheim, 1897 s 202). He came to this conclusion by considering

⁴ Translation from Swedish to English was done by the author of this thesis.

the extremely low suicide rates in the poorest parts of Europe, such as Ireland and the south of Italy. Thus, a precarious financial situation was not in Durkheim's view a reason for suicide. What does matter, according to Durkheim, is if an individual's financial situation changes, not the state itself. The role of wealth is still a matter of discussion and studies which consider socioeconomic factors analyse the importance of wealth in different ways, be it through income levels, GDP per capita, proportion of residents living below the poverty level or personal assets. Several studies show a correlation between decreasing income or major financial losses and increased suicide rates (Blakely et al, 2003) just as Durkheim suggested more than a century ago. However, there are also many studies contradicting Durkheim's view of static poverty not increasing the risk for suicide (see for example Hamermesh and Soss, 1974; Huang, 1996; Chuang and Huang, 1997; Berk et al, 2005; Rehkopf and Buka, 2005). In contrast to Durkheim, several studies show that poverty increases suicide rates. However, Jungeilges and Kirchgässner (2002) find that suicide rates increase with income.

Durkheim also mentioned fertility as a factor influencing suicide. The theory is that children give life meaning, not only in the way that it grants direct happiness, but also that there is someone dependent on you, which keeps you from taking your own life. Thus, strengthened social ties within the family reduce the risk for suicide. There is empirical evidence supporting the correlation between high fertility rates and low suicide rates (Lester and Yang, 1992; Chuang and Huang, 1997)

Naturally, there are lots of other socioeconomic factors that have been considered as influential on suicide rates. For example, different ways of measuring social fragmentation have been used and normally show an increased risk for suicide with greater socioeconomic disadvantage. For example, Lorant et al (2005) have used factors as education level and housing tenure to describe socioeconomic inequalities whereas Whitley et al (2005) consider voting patterns (abstention rates), car ownership, overcrowded housing and mobility to describe social fragmentation.

4 Data

When collecting data on suicide rates, I have followed the same procedure largely undertaken by other researchers. The most reliable source of aggregated country data for suicide rates seems to be the World Health Organization (WHO). The data on suicide statistics can be found in appendix A.

The variables I use for measuring social cohesion stem from World Value Survey 1999-2001 (Inglehart et al, 2004). The survey was carried out in 81 different countries through face to face

interviews where the interviewer asked several multiple choice questions. There were between 417 and 6 025 respondents in each country.

The measurement of social cohesion is based on the standard deviation of the responses to the different multiple choice questions. This is the same measure as used by Lindqvist and Östling (2006). In a society where people have similar opinions on different issues, one can say that social cohesion is high and vice versa. Note that the standard deviation says nothing about the average opinion in a society, only if people agree or disagree. A high standard deviation thus indicates little agreement and hence a low level of social cohesion. The multiple choice questions range from 1 to 10 at most (some questions range from 1 to 3 and some from 1 to 4) and the standard deviation therefore varies between 0 and 4.5, with 0 signifying that all respondents give the same answer, while 4.5 signifies that half of the population answers 10 and the other half 1.

It is possible that it is actually the mean value that affects suicide rates and not the standard deviation. In order to avoid this potential problem, I will control for the mean in all regressions. However, since answers at the extreme will be censored (bearing in mind there are only 10 alternatives at most), the mean might not depict the true mean of preferences. This will also affect the standard deviation. Consider a situation where most of the answers are located near the higher extreme value. Many of the respondents might have answered “11”, were there such an option. Not only will this give us a lower mean than the true mean, it also implies a lower standard deviation, since the end tail of the distribution is cut off. This leads to a correlation between the mean and the standard deviation. The same effect would occur if many of the respondents answer at the lower end of the scale. Thus, a high correlation between the mean and the standard deviation poses a problem. However, this problem is mitigated by excluding social cohesion variables from the data set if they show a correlation with the mean of 0,5 or more.

There is also another potential problem with using standard deviation as explanatory variable when there is a non-linear relationship between the probability of suicide and the answer to one of the multiple choice questions on an individual level. Suppose for example there is a concave relationship between ones opinion and the probability of suicide on the individual level. Then there will automatically be a negative correlation between social cohesion and suicide on the aggregated level, although this is a purely statistical artifact. This is due to the function having a negative second derivative. A country with a high standard deviation will then have a lower level of probability of suicides than a country with the same mean value but a lower standard deviation. Naturally, controlling for the mean will not mitigate this problem. For a more thorough discussion of the problems related to non linear relationships on the individual level when using standard deviation as explanatory variable, see for example Smith (1999). There is no

clear way to judge if there is any correlation at all between the actual opinion and the probability of suicide on the individual level, since there is no data accessible. However, I see no obvious reason for expecting any kind of correlation on an individual level between the probability of suicide and the answers to the questions used in this study to measure social cohesion.

For each question in the WVS, Lindqvist and Östling (2006) calculated the mean and standard deviation of the responses for every country. Thereafter, they excluded all variables with binary responses, fewer than 65 observations or a correlation between the country mean and standard deviation of 0.5 or more. They also excluded constructed indexes, questions about personal characteristics (income, age, etc) and questions for which the alternatives have no natural ordering. The 36 variables that met these criteria were then further classified into the following five groups depending of their theme of inquiry:

1. Economic policy (5 variables).
2. Confidence in governmental and non-governmental institutions (8 variables).
3. Attitudes toward democracy as a political system (8 variables).
4. Other political questions (7 variables).
5. Personal matters (8 variables)

The wording of each question can be found in appendix B.

For simplicity, I have decided not to use all cohesion variables. However, I have run all regressions in this study for the omitted cohesion variables as well, and these are available upon request.

I will focus on the group of questions labelled personal matters, since the difference in opinion on these questions seems more likely to affect a person's impetus to commit suicide. Two of the questions belonging to the group have been left out, however. The first question regards personal happiness. The results from this question most probably serve as a proxy for wealth distribution within a country. The second omitted question regards whether people see themselves as part of a local, regional, national or international geographical area. This question differs from the others insofar that there is no obvious scale which the answers follow, so the idea of using the standard deviation to estimate social cohesion is not applicable.

In order not to completely omit the other question categories, I include the one question with the highest number of observations from each category. In case there were several questions with the same amount of observations, I use the roll of a dice to decide which question to include. All in

all, there are ten cohesion measures in this study (six from the group of personal matters and one each from the other four groups).

In Table 1 I present the questions used in this study.

Table 1

Wording of each question	Name given	Category
When you get together with your friends, would you say you discuss political matters frequently, occasionally or never? (1 Frequently to 3 Never)	Discuss political matters	Personal/behaviour
For each of the following statements I read out, can you tell me how much you agree with each. Do you agree strongly, agree, disagree, or disagree strongly? A working mother can establish just as warm and secure a relationship with her children. (1 Agree strongly to 4 Strongly disagree)	Mother child relationship	Personal/behaviour
For each of the following statements I read out, can you tell me how much you agree with each. Do you agree strongly, agree, disagree, or disagree strongly? Being a housewife is just as fulfilling as working for pay. (1 Agree strongly to 4 Strongly disagree)	Being a housewife fulfilling	Personal/behaviour
How interested would you say you are in politics? (1 Very interested to 4 Not at all interested)	Interested in politics	Personal/behaviour
Now I'd like you to look at this card. I'm going to read out some different forms of political action that people can take, and I'd like you to tell me, for each one, whether you have actually done any of these things, whether you might do it or would never under any circumstances, do it: signing a petition. (1 Have done to 3 Would never do)	Signing a petition	Personal/behaviour
Now I'd like you to tell me your views on various issues. How would you place your views on this scale? 1 means you agree completely with the statement on the left (People should take more responsibility to provide for themselves); 10 means you agree completely with the statement on the right (The government should take more responsibility).	Government should take responsibility	Economic Policy
I am going to name a number of organisations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all? Parliament. (1 A great to 4 None at all)	Confidence in parliament	Confidence
I'm going to describe various types of political systems and ask what you think about each as a way of governing this country. For each one, would you say it is a very good, fairly good, fairly bad or very bad way of governing this country? Having a democratic political system. (1 Very good to 4 Very bad)	Opinion on democracy	Democracy
Apart from weddings, funerals and christenings, about how often do you attend religious services these day? (1 More than once a week to 8 Never practically never)	Attend religious services	Personal/behaviour
Please tell me for each of the following statements whether you think it can always be justified, never be justified, or something in between: Divorce. (1 Never justifiable to 10 Always justifiable)	Is divorce justifiable	Politics:other

I have used official data from the World Bank for macroeconomic variables. The variables used are GDP per capita, unemployment rate for each sex⁵, percentage of the population over the age of 65 and the fertility rate.⁶

I also use the Gini coefficient, which is based on primary household survey data obtained from government statistical agencies and World Bank country departments. Data for high-income economies are from the Luxembourg Income Study database.

⁵ Unemployment is measured as percentage of the male/female population in the work force who are not registered as employed.

⁶ Fertility is measured as the number of children that would be born to a woman if she were to live to the end of her childbearing years.

The collected data has several defects, especially the data on suicide rates. Considering the stigma surrounding suicide, it is obvious that a lot of suicides are not reported as suicides, but rather as ordinary deaths.

There are also several countries that do not report suicide statistics at all. Especially Sub-Saharan African countries provide very little data on suicide rates (Zimbabwe is the only mainland Sub-Saharan African country that has reported facts on suicide to the WHO during the last decade).

Another problem is to obtain data from the same time period for all variables. For the data from the World Bank, I have chosen 2003 as the year from which I have taken all the data available.⁷ This year was chosen since it was possible to obtain the same amount of data for the different countries that appear in this study as the previous year 2002, but far more than for the subsequent year 2004.

The WHO data presents more serious problems regarding periods and time lags. The latest figures for suicide rates span from 1979 till 2003 for the countries examined in this study. However, out of the 67 countries for which I have data on suicide, only three countries have suicide data from before 1990.⁸ The countries with data from 2000 or later amount to 47.

There are several reasons for these time lags, one being that there is an option for each country to present their suicide data every five years, since this is considered to illustrate the true state of the situation in a better way (in a small country, abnormal rates of suicide one year might provide a very distorted picture). A second reason is that every country processes their mortality data the subsequent year on a central level. Since this data must be internally verified and sometimes is delayed because of legal processes, single cases can delay the whole country's information sharing with the WHO (WHO 1999).

Using poorly matched data might lead to incorrect conclusions, weakening some true relationships and strengthening others that are not really existent. It is therefore important to discuss the stability of the different variables used. As pointed out by Lindqvist and Östling (2006), social cohesion seems to be fairly stable over time at the country level. This is also true for the fraction of people over the age of 65, the fertility rate, the log of GDP per capita and the Gini coefficient. These variables may show a trend in the long run, but over the time period dealt with here, this possible trend is unlikely to pose a major problem. Unemployment rates measured as percent unemployed of the active labour force is more problematic, since it can fluctuate a lot

⁷ Unemployment rates in Russia were taken from 2002, since no data for 2003 was available. The Gini coefficient has also been taken from different years, due to the data available.

⁸ These countries being Egypt, Jordan and Peru, which all will be discussed more thoroughly below.

more from year to year. The different religious denominations used in the regressions are very stable over time.

Apart from suicide rates, unemployment is the variable with least numbers of observations. It is important to bear this in mind when running regressions including the unemployment rate that the degrees of freedom decrease accordingly.

Another problem is that though social cohesion might be low at the national level, it could be very strong on a local level. Obvious examples are Sub-Saharan countries, which often are constituted of several different tribes that are very integrated societies at the community level. In this study, this is not much of a concern since almost no Sub-Saharan countries are part of the study because of lack of data.

5 Descriptive Statistics

Matching the data on suicide from the WHO and the cohesion measures calculated by Lindqvist and Östling (2006), 66 countries remain to be studied. Suicide rates differ a lot between countries, especially among men, as can be seen from Table 2.

Table 2

Variable	Obs	Mean	Std. Dev.	Min	Max
suicide male	66	19,8	16,3	0	74,3
suicide female	66	5,5	3,9	0	14,8
log gdp per capita	77	9,2	1,0	6,4	11,1
fertility	77	2,1	1,1	1,2	7,1
unemployment male	60	9,1	5,7	2,5	37,0
unemployment female	60	10,3	6,7	2,6	36,3
fraction over 65	76	10,6	5,0	2,5	19,3

Table 3 shows statistics for the cohesion measures. Theoretically, the maximum value is 4.5 and the minimum value is 0. However, it is important to note that several of the multiple choice questions did not present ten options, but sometimes only three or four. Obviously, the theoretical maximum then decreases, but the theoretical minimum stays the same.

Table 3⁹

Variable	Obs	Mean	Std. Dev.	Min	Max
Discuss political matters	78	0,64	0,05	0,52	0,76
Mother child relationship	74	0,81	0,12	0,47	1,12
Being a housewife fulfilling	74	0,84	0,13	0,51	1,16
Interested in politics	70	0,91	0,07	0,75	1,08
Signing a petition	76	0,69	0,09	0,36	0,84
Government should take responsibility	78	2,81	0,37	1,91	3,70
Confidence in parliament	76	0,81	0,11	0,53	1,07
Opinion on democracy	77	0,68	0,09	0,47	0,87
Attend religious services	77	2,16	0,39	1,20	3,15
Is divorce justifiable	78	2,75	0,42	1,39	3,72

Table 4 shows the ten countries which have the highest suicide rates for males and females. Eastern Europe, especially the former Soviet Union, dominates the statistics for men, whereas the female statistics are less concentrated to one region.

Table 4

male		female	
Lithuania	74,3	China	14,8
Russia	69,3	Lithuania	13,9
Belarus	63,3	Japan	12,8
Estonia	47,7	Hungary	12,0
Ukraine	46,7	Slovenia	12,0
Latvia	45,0	Russia	11,9
Slovenia	45,0	Belgium	11,4
Hungary	44,9	South Korea	11,2
Japan	35,2	Switzerland	10,6
Finland	31,9	Belarus	10,3

Number of suicides among a population of 100 000 persons a year for the worst affected countries.

⁹ Each letter and number combination represents one question from the WVS. The wording of each question can be found in appendix A.

6 Analysis

6.1 Specifications

Although Durkheim predicted a nonlinear correlation between social cohesion and suicide, for simplicity, I start with a linear regression model.

Since suicide statistics differ widely between the two sexes, it is reasonable to treat men and women separately and not use an aggregated mean value. Therefore, I run regressions for both sexes with their respective data (suicide rates and unemployment rates are different for men and women, while the rest of the data is the same for both sexes).

I use three different specifications per cohesion measure. All regressions have suicide rates as the dependent variable. Regression I contains the social cohesion measures and the mean values as regressors. In regression II the fraction of the population over the age of 65 and the log of GDP per capita are added as regressors. In regression III, unemployment, fertility rate and the Gini coefficient are added as regressors, all in all seven variables.

There are several reasons for using different specifications. First, I want to see if there is any correlation between social cohesion and suicide rates whatsoever. Regression I is therefore self-explanatory. However, correlation between social cohesion and suicide does not necessarily imply a causal relationship. First of all, the direction of causality is not identified (even though the most plausible assumption would be to regard suicide as an effect of the social state and not the other way around). Moreover, even if the direction of the causality is considered to be clear, social cohesion is not necessarily the direct cause of suicide. If social cohesion is correlated with other factors that explain suicide rates, then not including these factors in the regression will lead to omitted variable bias. For example, a large part of the population are elderly, which means that there is a diversity of different age groups, which could lead to an increase in different opinions meaning a low level of social cohesion. At the same time, we are aware of the fact that older people are more prone to commit suicide. Thus, we would see a spurious correlation between social cohesion and suicide rates in this case.

Since older people have higher suicide rates than young people, it seems logical to control for how old the population is. GDP per capita is also a legitimate control variable, since wealth could very well affect suicide rates (be it positively or negatively). It is reasonable to believe that a country with a high GDP per capita also possesses better methods and information channels on reporting and collecting data on suicide. Thus, wealth will be positively correlated with suicide

rates reported, even though wealth itself does not encourage people to take their own life. Controlling for the log of GDP per capita, this problem will be diminished.

Another variable which is very often included in empirical studies on suicide is unemployment. I choose not to include unemployment rates in specification II, because of the problem with lack of data mentioned earlier. Including unemployment as a regressor, approximately ten observations from most of the regressions are lost.

Theoretically, higher fertility should decrease suicide rates because of sentimental attachments to children. At the same time, we know that poorer countries have higher fertility rates and probably are less efficient in detecting and reporting suicide rates to the WHO. Thus, there might be a spurious correlation between high fertility and low suicide rates. However, controlling for GDP per capita mitigates this problem.

The distribution of income within a society can theoretically lead to two different outcomes depending on to what extent the distribution is driven. A certain degree of income distribution would probably decrease the incentives to commit suicide, but if income distribution is highly prioritized in a country, this could lead to disincentives to work and frustration for those who want to reap the benefits of their work but are not permitted to do so. Thus, from a certain level on, income distribution could increase suicide rates (Jungeilges and Kirchgässner, 2002). I will use the Gini coefficient to control for income distribution as a factor affecting suicide rates.

Controlling for as many variables as I do can be deceiving. The main reason for adding the explanatory variables is to avoid omitted variable bias. However, for each regressor added, the chances of detecting a correlation between social cohesion and suicide could be diminished, since the correlation might be accounted for through one of the explanatory variables. For example, strong social cohesion might lead to low unemployment which in turn leads to low suicide rates. If this is the case, unemployment should not be included as an explanatory variable if we want to examine the total effect of social cohesion on suicide rates, both directly and indirectly. Controlling for unemployment, it would seem that social cohesion actually has less influence on suicide rates than what is the case. On the other hand, if we only want to see the direct effects of social cohesion on suicide rates, unemployment should be included as a regressor. However, the direction of causality might be the opposite; low unemployment leads to strong social cohesion and low suicide rates. Thus, there is no direct or indirect effect of social cohesion on suicide rates and unemployment should be included in the specification in order to avoid omitted variable bias.

6.2 Regression results

All regressions are estimated using OLS with heteroskedasticity robust standard errors.

Throughout the rest of the thesis I refer to a 10 % level of significance when stating that a coefficient is statistically significant. There are ten social cohesion variables in each specification, thus a total of 30 for each sex since there are three specifications.

For the male population, specification I contains the largest number of significant coefficients of all specifications. Out of ten variables, five are statistically significant. This amount drops when controlling for the other variables. Log GDP and fraction of the population over the age of 65 reduce the number of statistically significant variables to three, and in specification III only one variable is statistically significant.

For females, specification I renders six statistically significant coefficients out of ten. For specification II the number drops to three, and for the last specification two variables are statistically significant. Interestingly, one is a variable that didn't show any statistical significance in the previous specifications.

Maybe the most interesting result from the three specifications is that out of nine statistically significant variables of social cohesion from the male data set, all show a negative correlation with suicide. This indicates that less social cohesion is correlated to fewer suicides. For the female data set, this tendency is similar; out of eleven statistically significant variables of social cohesion, ten show a negative correlation with suicide. The exception being the variable belonging to the group of questions regarding economic policy, which is positively correlated with suicide in specification III.

Table 5

	male			female		
	I	II	III	I	II	III
Discuss political matters	-62.86* (-1.79)	-51.22** (-2.03)	-27.98 (-.56)	-14.5 (-1.29)	-10.35 (-1.02)	-12.45 (-1.27)
Mother child relationship	-31.06** (-2.36)	-17.71* (-1.8)	-17.29 (-1.45)	-12.05*** (-3.4)	-10.54** (-2.57)	-3.69 (-.98)
Being a housewife fulfilling	-24.67 (-1.54)	-4.48 (-.36)	-11.22 (-.93)	-9.74** (-2.37)	-6.41 (-1.5)	-2.98 (-.9)
Interested in politics	-104.1*** (-3.22)	-75.59*** (-2.72)	-54.76 (-1.34)	-23.36*** (-3.22)	-17.72** (-2.53)	-11.79 (-1.29)
Signing a petition	17.01 (.85)	-7.32 (-.41)	.27 (.01)	4.55 (1.03)	-.43 (-.1)	1.16 (.29)
Government should take responsibility	-6.71* (-1.75)	7.12 (1.5)	10.98 (1.64)	-1.71 (-1.38)	1.97 (1.46)	3.49** (2.29)
Confidence in parliament	-38.99** (-2.05)	-14.97 (-.66)	2.83 (.08)	-16.04*** (-3.24)	-11.75 (-1.62)	2.37 (.38)
Opinion on democracy	-34.77 (-1.64)	-17.45 (-1.32)	-30.55** (-2.22)	-16.09*** (-3.12)	-13.68** (-2.29)	-9.67** (-2.45)
Attend religious services	-6.07 (-1.06)	-.79 (-.19)	-3.15 (-.44)	-2.19* (-1.73)	-1.77 (-1.31)	0 0
Is divorce justifiable	-7.53 (-1.65)	-2.04 (-.46)	3.67 (.41)	-1.76 (-1.5)	-.34 (-.3)	1.53 (.89)

Table 5 reports the coefficient and t statistic from the three specifications for the male and female data set. Bold coefficients are statistically significant. One asterisk denotes significance at the 10 % level, two asterisks at the 5 % level and three asterisks at the 1 % level.

6.3 Nonlinear regression

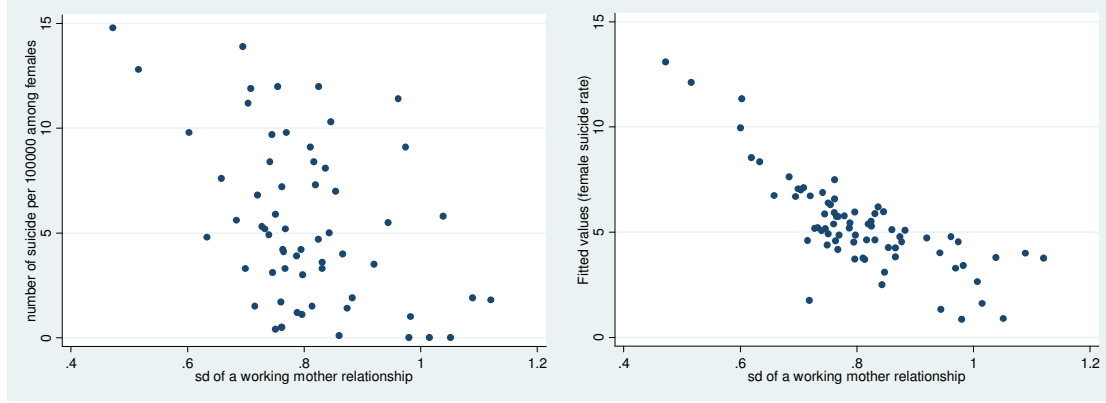
In order to test the U-shaped relationship between suicide rates and social cohesion suggested by Durkheim, it is necessary to test a nonlinear regression model. The simplest regression then contains the standard deviation, the square of the standard deviation and the mean values. Thus, there are 30 pairs of coefficients for each sex.

In general it is rare that only one of the two coefficients (the cohesion measure and the squared cohesion measure) is significant. In fact, there is only one exception to this rule. Out of a total of six couples of statistically significant variables in the male data set for all three specifications, five exhibit a concave function (the social cohesion variable being positive and the squared social cohesion variable being negative). This means that with moderate standard deviation of the variable (moderate social cohesion), suicide rates increase, whereas more extreme values of the standard deviation (and accordingly more extreme values of social cohesion), would make suicide rates drop. This is the exact opposite of what Durkheim predicted.

However, for the female data set the results are quite different. There are ten pairs of statistically significant variables for all three specifications and nine of these exhibit a convex function (the

social cohesion variable being negative and the squared social cohesion variable being positive). Thus, it seems that Durkheim's hypothesis is supported by the female data set to some extent.

Figure 1



The graph to the left shows the actual data from the female data set for the Mother child relationship question and its relationship with suicide rates, whereas the graph to the right shows the fitted data according to specification I.

It is important to note, however, that although the coefficients in the nonlinear regression model indicate certain trends for both the male and the female data set, these trends are not necessarily observable through the data in the study. Just by looking at Figure 1, one might think there is only a negative relationship between the social cohesion variable and suicide rates, and not a U-shaped relationship. To examine if there is a U-shaped relationship, it is necessary to differentiate the regression function and examine at what point the sign of the first derivative is changed.

Consider the function:

$$y = a + bx + cx^2$$

where y equals suicide rates, x is the social cohesion variable, a entails the intercept and other variables tested for (in specification I, it would then also entail the mean value) and b and c are the coefficients reported in Table 6 and Table 7.

Differentiating this equation leads to:

$$y' = b + 2cx$$

Setting

$$y' = 0$$

leads to

$$x = -\frac{b}{2c}$$

For the Mother child relationship question, x equals 1.02 when setting $b=-61.3$ and $c=30.0$ (both values taken from Table 7). Recall that the value of the social cohesion variable for the Mother child relationship question has a minimum of 0.47 and a maximum of 1.12 (from Table 3), indicating that there is a U-shaped relationship between the social cohesion variable and suicide rates for the Mother child relationship question.

See appendix C for graphs and calculated values of x when $y'=0$ of the other statistically significant social cohesion variables in specification I of the nonlinear regression model.

Comparing the linear and the nonlinear regression models, it is clear that the linear model yields more statistically significant results, especially for the male data set. For the female data set, the nonlinear regression model shows interesting results. It is noteworthy that specification I contains fewer statistically significant coefficients than the other two specifications. In the linear regression model, the result is the opposite.

Among the male data set there is one variable that stays statistically significant through all specifications (f 028, inquiring how often one attends religious services). However, the coefficients vary widely between the different specifications. For the female data set, the coefficients that stay statistically significant in all specifications are more stable.

Table 6

	male					
	I	I (squared)	II	II (squared)	III	III (squared)
Discuss political matters	207.53 (.31)	-211.15 (-.42)	-470.27 (-1.09)	327.64 -1	-971.44* (-1.99)	745.43* (1.91)
Mother child relationship	46.68 (.49)	-47.34 (-.86)	-70.71 (-.95)	32.55 (.78)	-211.77* (-1.71)	117.25* (1.69)
Being a housewife fulfilling	-24.07 (-.22)	-.35 (-.01)	-91.36 (-1.2)	51.28 (1.2)	-173.15 (-1.19)	93.13 (1.18)
Interested in politics	-420.79 (-.62)	176.21 (.48)	-569.15 (-.89)	275.22 (.8)	-541.37 (-.65)	275.02 (.61)
Signing a petition	34.07 (.3)	-13.24 (-.14)	-45.73 (-.42)	29.68 (.33)	-163.28 (-1.46)	129.78 (1.35)
Government should take responsibility	124.71*** (2.68)	-22.93*** (-2.88)	47.22 (1.44)	-7.03 (-1.33)	8.55 (.18)	.43 (.05)
Confidence in parliament	234.66 (.72)	-171.1 (-.89)	-246.91 (-.84)	148.33 (.83)	-391.99 (-.81)	253.48 (.87)
Opinion on democracy	207.16 -1	-181.73 (-1.2)	110.25 (.7)	-95.92 (-.83)	-17.79 (-.08)	-9.22 (-.06)
Attend religious services	123.09*** (3.07)	-29.58*** (-3.16)	84.84** (2.17)	-19.71** (-2.17)	180.08** (2.46)	-42.83** (-2.48)
Is divorce justifiable	112.28* (1.93)	-21.02** (-2.08)	23.07 (.47)	-4.45 (-.53)	-7.22 (-.08)	1.92 (.14)

Table 6 reports the coefficient and t statistic from the three specifications of the nonlinear regression model for the male data set. Bold coefficients are statistically significant. One asterisk denotes significance at the 10 % level, two asterisks at the 5 % level and three asterisks at the 1 % level.

Table 7

	female					
	I	I (squared)	II	II (squared)	III	III (squared)
Discuss political matters	-140.92 (-.62)	98.72 (.56)	-282.68 (-1.39)	212.92 (1.32)	-254.32** (-2.03)	190.97* (1.96)
Mother child relationship	-61.3*** (-3.4)	29.99*** (2.72)	-82.87*** (-4.03)	44.41*** (3.61)	-69.03*** (-3.63)	39.33*** (3.59)
Being a housewife fulfilling	-76.71** (-2.43)	39.35** (2.11)	-85.4*** (-2.67)	46.63** (2.55)	-63.02** (-2.7)	34.54*** (2.71)
Interested in politics	-109.34 (-.76)	47.84 (.61)	-138.18 (-.94)	67.17 (.83)	-185.71 (-1.21)	98.52 (1.17)
Signing a petition	32.87 (1.05)	-21.97 (-.86)	17.6 (.57)	-13.93 (-.54)	6.84 (.25)	-4.5 (-.2)
Government should take responsibility	9.55 (.79)	-1.96 (-.93)	-3.88 (-.38)	1.02 (.59)	1.52 (.13)	.35 (.17)
Confidence in parliament	-53.29 (-.78)	23.29 (.56)	-177.63*** (-2.85)	106.08*** (2.79)	-121.2* (-1.71)	79.34* (1.85)
Opinion on democracy	-1.9 (-.03)	-10.66 (-.25)	-24.57 (-.36)	8.18 (.17)	56.25 (1.13)	-47.71 (-1.34)
Attend religious services	13.42 (1.27)	-3.57 (-1.57)	7.54 (.53)	-2.14 (-.7)	36.96** (2.1)	-8.64** (-2.1)
Is divorce justifiable	19.87 (1.08)	-3.8 (-1.17)	-1.31 (-.07)	.17 (.05)	-24.03 (-1.59)	4.51* (1.79)

Table 7 reports the coefficient and t statistic from the three specifications of the nonlinear regression model for the female data set. Bold coefficients are statistically significant. One asterisk denotes significance at the 10 % level, two asterisks at the 5 % level and three asterisks at the 1 % level.

Possibly, the different question groups should be treated separately with different regression models in order to obtain the results most descriptive of reality. I will however stick to the linear model, mainly because of the contradicting results for the different sexes of the nonlinear regression model and the very weak results for the male data set, indicating that this model doesn't fit the data very well.

6.4 Robustness

Although the result from specification I thru III for the linear regression model indicates that there might be a positive relationship between social cohesion and suicide rates, it is necessary to check the robustness of these findings.

For example, it might be that geographical regions show similar suicidal behaviour (be it for reasons of culture, economy or others) but that there are differences between the different regions. Then it is reasonable to include dummies for each region.

Controlling for region might either strengthen or weaken the correlation between suicide and social cohesion depending on the suicidal behaviour in the different regions. For example, since the collapse of the Soviet Union we have seen exceptionally high suicide rates in Eastern Europe. Suppose that suicide is correlated with social cohesion in all societies, but that regional factors have dislocated this correlation to a higher level for Eastern Europe. Including all data in the same regression could render a rather weak result, whereas a dummy for Eastern Europe would allow us to see the real correlation between social cohesion and suicide. Now consider a situation where there are clear differences across regions both regarding social cohesion and suicide rates and taking all samples into account, suicide rates show a positive correlation with social cohesion. Assuming that this is a true relationship (suicide rates increase with social cohesion), dividing the data set in different regions might weaken the result. Possibly the trend within each region is not clear enough due to – for example – too little data or measurement errors.

During the 90's, suicide rates in Eastern Europe, especially the former Soviet Union, rose dramatically (Brainerd 2001). This has been associated with a collapse of the social welfare system, extreme inflation and decreasing GDP rates. In the regressions I control for the log GDP per capita, but this does not provide any information on how GDP has fluctuated (thus, suicides committed because of big changes in the economy will not be recognised in the regressions). According to Durkheim (1897) big changes in the economy (booms and recessions) lead to higher suicide rates. Therefore, it is reasonable to use a dummy to control for the contemporary economic development of Eastern Europe. Of the ten countries with highest suicide rates among the male population, eight are located in Eastern Europe (the other two being Finland and Japan). The top five countries are all former republics of the Soviet Union. The picture is slightly different for females; five out of the top ten countries are Eastern European countries. Of the top five, three are located in Eastern Europe.

Thus, for all three specifications I include a dummy for Eastern Europe.

Only controlling for Eastern Europe, the results are similar to when not controlling for regions at all. Specification I shows significance for four coefficients for males and five for females. Specification II and III contain three and two statistically significant coefficients for each sex respectively.

There are two positively correlated statistically significant coefficients when using Eastern Europe as a dummy and they both belong to the question regarding economic policy (one for males – specification II – and one for females – specification III).

It is noteworthy that the question regarding democracy shows statistical significance for all three specifications for the female data set. This is also the case when not controlling for Eastern Europe.

Table 8

	male			female		
	I	II	III	I	II	III
Discuss political matters	-45.19 (-1.47)	-17.24 (-.72)	-4.57 (-.11)	-12.97 (-1.16)	-7.69 (-.8)	-11.23 (-1.2)
Mother child relationship	-22.92** (-2.12)	-17.22* (-1.8)	-30.02* (-2.02)	-11.48*** (-3.03)	-10.5** (-2.35)	-5.46 (-1.27)
Being a housewife fulfilling	-14.03 (-1.06)	-1.94 (-.17)	-15.04 (-1.22)	-8.77** (-2.04)	-6.16 (-1.35)	-3.51 (-.96)
Interested in politics	-83.01*** (-3.14)	-52.82** (-2.2)	-45.21 (-1.28)	-22.66*** (-3.13)	-17.27** (-2.45)	-11.05 (-1.23)
Signing a petition	13.15 (.86)	-4.02 (-.24)	8.37 (.42)	3.97 (.94)	-.03 (-.01)	1.65 (.37)
Government should take responsibility	-6.6** (-2.21)	7.9* (1.71)	8.33 (1.39)	-1.69 (-1.35)	2.04 (1.49)	3.17** (2.08)
Confidence in parliament	-39.37** (-2.36)	-3.05 (-.14)	2.14 (.07)	-16.09*** (-3.28)	-10.8 (-1.43)	2.41 (.39)
Opinion on democracy	-23.91 (-1.35)	-16.79 (-1.35)	-28.91** (-2.16)	-15.6*** (-2.83)	-13.69** (-2.29)	-9.66** (-2.41)
Attend religious services	-.17 (-.04)	.51 (.17)	-.68 (-.13)	-1.8 (-1.38)	-1.67 (-1.17)	.1 (.06)
Is divorce justifiable	-5.61 (-1.59)	-1.69 (-.41)	-.25 (-.03)	-1.55 (-1.38)	-.31 (-.27)	1.1 (.64)

Table 8 reports the coefficient and t statistic from the three specifications for the male and female data set controlled for Eastern Europe. Bold coefficients are statistically significant. One asterisk denotes significance at the 10 % level, two asterisks at the 5 % level and three asterisks at the 1 % level.

It is reasonable not to control only for Eastern Europe, but also other geographical regions to see if there is any regional pattern regarding social cohesion and suicide. I include dummies for Latin America and the Caribbean, the Western World and Eastern Europe, in the basic specifications. The countries remaining (mainly Asian) then constitute the reference group. With this division, twelve countries do not belong to any of the regions defined. For a complete list of the geographical division, see appendix D. This division is of course not the only one possible, and maybe not even the best. For example, sub-Saharan African countries, the Middle East and North Africa, Southeast Asia and South Asia could have been other areas given a dummy variable. However, data of suicide rates from these parts of the world is scarce and these regions would each contain less than a handful of countries.

The overall results are weakened for both sexes when including regional dummies. Only two variables for each sex show statistical significance, all negatively correlated with suicide rates. Two belong to specification I and the remaining two to one specification each. The statistically

significant variables of the female data set both belong to the question regarding democracy (specification I and II).

Table 9

	male			female		
	I	II	III	I	II	III
Discuss political matters	-24.89 (-.74)	-14.12 (-.46)	-1.76 (-.04)	3.05 (.27)	4.76 (.44)	-8.2 (-.92)
Mother child relationship	-17.46 (-1.24)	-13.6 (-.98)	-27.7* (-1.72)	-3.14 (-.79)	-2.19 (-.55)	-2.83 (-.67)
Being a housewife fulfilling	-2.68 (-.18)	4.93 (.35)	-14.13 (-1.01)	-.84 (-.24)	.88 (.27)	-1.45 (-.41)
Interested in politics	-64.34* (-1.97)	-44.49 (-1.53)	-38.67 (-1.1)	-10.88 (-1.49)	-6.5 (-.95)	-6.99 (-.87)
Signing a petition	15.37 (1.02)	-7.75 (-.44)	3.41 (.16)	5.15 (1.39)	.06 (.02)	-.23 (-.05)
Government should take responsibility	-7.15 (-1.42)	7.07 (1.09)	3.55 (.53)	-.88 (-.69)	2.48 (1.41)	1.17 (.72)
Confidence in parliament	-12.17 (-.48)	6.86 (.28)	.82 (.03)	-6.47 (-1.17)	-3.26 (-.58)	1.73 (.28)
Opinion on democracy	-24.89 (-1.55)	-15.34 (-1.06)	-19.72 (-1.34)	-10.74** (-2.56)	-8.35* (-1.88)	-3.98 (-1)
Attend religious services	2.86 (.83)	2.51 (.81)	.31 (.06)	.26 (.3)	.27 (.28)	.65 (.51)
Is divorce justifiable	-4.01 (-.52)	-6.16 (-.75)	-6.45 (-.64)	1 (.63)	.46 (.27)	-.71 (-.38)

Table 9 reports the coefficient and t statistic from the three specifications for the male and female data set controlled for region. Bold coefficients are statistically significant. One asterisk denotes significance at the 10 % level, two asterisks at the 5 % level and three asterisks at the 1 % level.

As already mentioned, several obstacles appear when collecting data on suicide rates. In order to avoid the most dubious data, I run the regressions omitting all countries reporting a suicide rate lower than 1 person for every 100 000 during that year. Hopefully, this will provide a more realistic picture of what the correlation between suicide and cohesion really looks like. This automatically omits all data collected before 1990, since the data for Jordan, Egypt and Peru present suicide rates lower than 1 for both males and females. This results in five fewer observations for the male data set and eight fewer for the female data set.¹⁰ It is important to note, however, that this eliminates official data presented by the WHO. If the data is correct it is a mistake to exclude the selected countries and we will get a biased estimate. It is of course also a matter of debate whether one or less suicides per 100 000 should be judged as implausible and not, for example, two or less.

¹⁰ Apart from the countries stated above, both the Dominican Republic and Iran were omitted for the regressions for both men and women. Additionally, Azerbaijan, Armenia and Mexico did not have suicide rates higher than what was required to be judged as credible for the female data set.

When excluding certain suicide data the results are very similar to the basic specifications and when controlling for Eastern Europe. Specification I contains four and five statistically significant variables for the male and female data set, respectively. For specification II these figures amount to three and four, and for specification III one and two, respectively.

Only one statistically significant variable is positively correlated with suicide and as in previous specifications, this variable belongs to the group of questions regarding economic policy. The question on democracy still yields highly significant results for the female data set in all three specifications.

Table 10

	male			female		
	I	II	III	I	II	III
Discuss political matters	-60.92* (-1.68)	-54.6* (-1.97)	-23.54 (-.46)	-12.45 (-1.08)	-11.78 (-1.08)	-11.15 (-1.08)
Mother child relationship	-28.92** (-2.09)	-19.65* (-1.89)	-19.62 (-1.61)	-11.37*** (-3.04)	-11.19*** (-2.81)	-4.34 (-1.09)
Being a housewife fulfilling	-18.39 (-1.11)	-4.53 (-.35)	-12.65 (-1.01)	-8.38** (-2.06)	-6.89 (-1.66)	-3.42 (-.97)
Interested in politics	-87.23** (-2.47)	-75.26** (-2.4)	-48.35 (-1.09)	-16.28** (-2.08)	-15.29* (-1.94)	-10.43 (-1.08)
Signing a petition	4.21 (.2)	-11.76 (-.61)	-.08 0	.67 (.14)	-2.01 (-.45)	1.3 (.32)
Government should take responsibility	-4.22 (-1.01)	6.96 (1.25)	9.6 (1.43)	-.76 (-.57)	1.5 (.95)	4.25*** (2.7)
Confidence in parliament	-46.42** (-2)	-29.46 (-.98)	-4.78 (-.12)	-14.54*** (-2.81)	-15.25** (-2.17)	.4 (.06)
Opinion on democracy	-30.16 (-1.34)	-16.9 (-1.17)	-30.04** (-2.04)	-18.58*** (-4.08)	-16.46*** (-2.81)	-10.47** (-2.43)
Attend religious services	-3.11 (-.5)	.63 (.12)	-5.38 (-.72)	-2.2 (-1.5)	-1.95 (-1.23)	-.7 (-.39)
Is divorce justifiable	-8.39* (-1.7)	-3.2 (-.63)	2.24 (.23)	-1.79 (-1.45)	-.99 (-.82)	1.53 (.84)

Table 10 reports the coefficient and t statistic from the three specifications for the male and female data set omitting countries reporting less than 1 suicide per 100 000 persons per year. Bold coefficients are statistically significant. One asterisk denotes significance at the 10 % level, two asterisks at the 5 % level and three asterisks at the 1 % level.

Possibly, different cultural and/or religious traits influence how prone people are to committing suicide. Durkheim concluded that Protestantism, being less rigid in its interpretation of the Bible and having a much weaker hierarchy than the Catholic Church, leads to higher suicide rates. Since both religions equally strongly condemn suicide and preach a life after death, Durkheim didn't see it as a trait of religion itself, but rather that religion did or did not lead to a stable society where the individual knew his place, which in turn affected suicide rates. Protestantism, in Durkheim's view, provided a lot of liberty for the individual who could then come to the conclusion that suicide was the only way out from a life in despair. The Catholic Church did not

provide the same option, since the dogmas of the Church were not to be questioned in any way. Thus, the reason for higher suicide rates among protestant countries compared to Catholic countries in Europe during the 19th century, was the lower level of social cohesion in protestant countries. This means that we are dealing with egoistic suicide. It is worth mentioning that Lindqvist and Östling (2006), as opposed to Durkheim, found Catholic countries to have lower levels of social cohesion than Protestant countries. This contradiction doesn't necessarily mean that one of the two conclusions is wrong, considering that the two studies were undertaken more than 100 years apart and although social cohesion seems to be stable with time (Lindqvist and Östling, 2006), societies are likely to undergo changes in the long run.

In order to test for the possibility that it is in fact a religious trait (or one or several confounding factors of this trait) that affects suicide rates and not social cohesion, I run all regressions testing for religion.

Testing for religious affiliation, the pattern is similar to other robustness checks. Specification I yields three statistically significant coefficients for males and four for females, respectively. Specification II decreases the amount of statistically significant coefficients for males to two, whereas the amount for women is unaltered. Finally specification III yields two statistically significant coefficients for each sex. For males, all statistically significant cohesion variables are negatively correlated with suicide rates. For females, once again the question regarding democracy is highly significant in all three specifications and negatively correlated with suicide rates, whereas the question about economic policy shows positive correlation with suicide rates in specification II and III.

Table 11

	male			female		
	I	II	III	I	II	III
Discuss political matters	-74.99* (-1.78)	-63.75* (-1.91)	-31.12 (-.52)	-12.73 (-1.16)	-9.37 (-.9)	-13.81 (-1.23)
Mother child relationship	-20.87 (-1.14)	-16.3 (-1.01)	-28.97* (-1.71)	-8.55** (-2.12)	-7.73* (-1.77)	-5.7 (-1.34)
Being a housewife fulfilling	-10.15 (-.49)	-.56 (-.03)	-20.83 (-1.28)	-5.2 (-1.34)	-3.31 (-.84)	-4.53 (-1.17)
Interested in politics	-94.97** (-2.42)	-79.39** (-2.29)	-64.8 (-1.29)	-17.65** (-2.2)	-15.28* (-1.91)	-14.88 (-1.5)
Signing a petition	14.3 (.72)	-9.77 (-.62)	-14.29 (-.76)	5.22 (1.24)	.75 (.17)	-.21 (-.05)
Government should take responsibility	-5.35 (-1.22)	7.67 (1.27)	8.59 (1.18)	-.65 (-.51)	3.42** (2.07)	3.5* (2.01)
Confidence in parliament	-24.34 (-.88)	-9.05 (-.3)	24.28 (.62)	-11.99** (-2.28)	-8.84 (-1.29)	7.48 (1.21)
Opinion on democracy	-27.36 (-1.37)	-13.91 (-1.06)	-27.01* (-1.84)	-13.26*** (-2.86)	-12.5** (-2.17)	-10.1** (-2.38)
Attend religious services	-3.88 (-.64)	-.8 (-.17)	-14.52 (-1.49)	-1.44 (-1.22)	-1.34 (-1.07)	-1.58 (-.83)
Is divorce justifiable	-11.05* (-1.78)	-5.11 (-.71)	-3.35 (-.28)	-1.38 (-.9)	.93 (.55)	.89 (.4)

Table 11 reports the coefficient and t statistic from the three specifications for the male and female data set controlled for religious affiliation. Bold coefficients are statistically significant. One asterisk denotes significance at the 10 % level, two asterisks at the 5 % level and three asterisks at the 1 % level.

7 Discussion

The linear regression model gives an indication that strong social cohesion is in general correlated with higher suicide rates. It is noteworthy that very few of the statistically significant variables show the inverse relationship. For all regressions run, there are 79 statistically significant cohesion variables. Out of these, six show a positive correlation with suicide rates. Four of these six belong to specification III for the female data set and the question regarding economic policy. Thus, Durkheim's hypothesis seems to hold for strong social cohesion. On the other hand, an opposite result (which could be interpreted as weak social cohesion being correlated with high suicide rates) would also support Durkheim's hypothesis. In any case, the results are not overwhelming and should therefore be interpreted carefully.

For both men and women in specification III, there are at most two statistically significant variables out of ten possible. For the female data set, when there are two statistically significant variables in specification III, they always show opposite signs of correlation. Considering that I use a level of 10 % for statistical significance, the results are very weak for specification III.

The model also suggests that strong social cohesion, i.e. homogeneity in preferences, when it comes to economic policy, would reduce suicide rates among women. Drawing any conclusions from this finding is quite difficult, especially since the amount of data is very small and the division of questions into different categories can be seen as arbitrary.

All robustness tests apart from when controlling for regions, provide very similar results to the basic specifications. Thus, the model seems pretty robust. The reason for the very weak results when controlling for regions could be due to the fact that each region consists of countries with similar levels of social cohesion, making it difficult to detect a correlation between suicide and social cohesion within each region. However, the weak results could of course also be due to that there is no direct or indirect effect of social cohesion on suicide rates and that the control variables are accurately chosen. However, it is important to note that even if the control variables for specification III explain the cross country suicide rates, this doesn't necessarily indicate that there is no effect of social cohesion on suicide rates. Possibly, some of the control variables are in fact effects of social cohesion, which in turn affect suicide rates. The direction of causality could of course also be the opposite.

The nonlinear model provides some evidence supporting Durkheim's hypothesis of a U-shaped relationship between suicide and social cohesion, but only for the female data set. When comparing the two models, it is especially interesting that the nonlinear regression model is being strengthened for the female data set when controlling for other variables. The linear model shows an opposite trend, with weakened results when adding regressors. A more thorough study of the nonlinear regression model with robustness checks is necessary in order to make any further judgment of its suitability.

Perhaps the main problem for this study is the uncertain data on suicide statistics. Underreporting of suicide rates is a well known problem, both due to the sometimes unclear causes of death, but mainly because of the social stigma associated with suicide. The way suicide statistics are collected, this stigma could lead to underreporting in two stages; both at local and national level, further weakening the credibility of the data. Possibly, there are also different ways in different countries of how to define suicide, which makes a cross-country analysis less suitable.

For the reasons just mentioned, it would be interesting to carry out a similar study but for a single country and compare different regions within the country. In this way, several statistical problems would be eliminated or at least strongly mitigated, since methods of measuring and collecting data

probably don't vary a lot within the country. A possibility would be to compare the different states of the USA.

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9 Appendices

Appendix A

Number of suicides per year per 100 000 persons.

country	males	females	country	males	females
Albania	4.7	3.3	Israel	9.9	2.7
Argentina	9.9	3.0	Italy	11.1	3.3
Armenia	3.2	0.5	Japan	35.2	12.8
Australia	20.1	5.3	Jordan	0.0	0.0
Austria	27.1	9.3	Latvia	45.0	9.7
Azerbaijan	1.8	0.5	Lithuania	74.3	13.9
Belarus	63.3	10.3	Luxembourg	18.5	3.5
Belgium	31.2	11.4	Macedonia	9.5	4.0
Bosnia Hzg	20.3	3.3	Malta	8.6	1.5
Brazil	6.6	1.8	Mexico	5.4	1.0
Bulgaria	21.0	7.3	Moldova	30.6	4.8
Canada	18.7	5.2	Netherlands	12.7	5.9
Chile	10.2	1.4	New Zealand	19.8	4.2
China	13.0	14.8	Norway	16.1	5.8
Colombia	5.5	1.5	Peru	0.6	0.4
Croatia	31.4	8.4	Philippines	2.5	1.7
Czech Rep	27.5	6.8	Poland	26.6	5.0
Denmark	20.2	7.2	Portugal	18.9	4.9
Dominican Rep	0.0	0.0	Puerto Rico	16.0	1.9
Egypt	0.1	0.0	Romania	23.9	4.7
El Salvador	10.4	5.5	Russia	69.3	11.9
Estonia	47.7	9.8	Singapore	11.4	7.6
Finland	31.9	9.8	Slovakia	23.6	3.6
France	26.6	9.1	Slovenia	45.0	12.0
Georgia	3.4	1.1	South Korea	24.7	11.2
Germany	20.4	7.0	Spain	12.6	3.9
Great Britain	10.8	3.1	Sweden	18.9	8.1
Greece	4.7	1.2	Switzerland	26.5	10.6
Hungary	44.9	12.0	Ukraine	46.7	8.4
Iceland	19.6	5.6	USA	17.6	4.1
India	12.2	9.1	Uruguay	16.6	4.2
Iran	0.3	0.1	Venezuela	8.3	1.9
Ireland	21.4	4.1	Zimbabwe	10.6	5.2

Appendix B

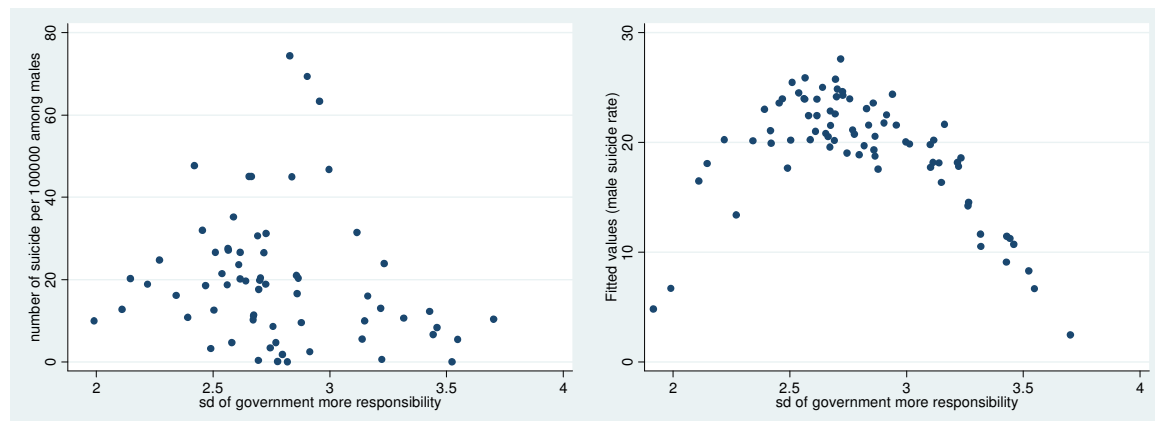
Appendix B contains the 36 different questions from the World Value Survey which were used in the study carried out by Lindqvist and Östling (2006). The ones used in this study are marked in bold text.

Variable name	Description
a004	POLITICS IMPORTANT. For each of the following aspects, indicate how important it is in your life: politics. (1 Very important to 4 Not at all important)
a008	FEELING OF HAPPINESS. Taking all things together, how happy would you say you are? (1 Very happy to 4 Not at all happy)
a062	HOW OFTEN DISCUSSES POLITICAL MATTERS. When you get together with your friends, would you say you discuss political matters frequently, occasionally or never? (1 Frequently to 3 Never)
b002	INCREASE IN TAXES IF EXTRA MONEY USED TO PREVENT ENVIRONMENT. I am now going to read out some statements about the environment. For each one read out, can you tell me whether you agree strongly, agree, disagree or strongly disagree?: I would agree to an increase in taxes if the extra money were used to prevent environmental pollution. (1 Strongly agree to 4 Strongly disagree)
d056	A WORKING MOTHER RELATIONSHIP. For each of the following statements I read out, can you tell me how much you agree with each. Do you agree strongly, agree, disagree, or disagree strongly? A working mother can establish just as warm and secure a relationship with her children. (1 Agree strongly to 4 Strongly disagree)
d057	BEING A HOUSEWIFE FULFILLING. For each of the following statements I read out, can you tell me how much you agree with each. Do you agree strongly, agree, disagree, or disagree strongly?. Being a housewife is just as fulfilling as working for pay. (1 Agree strongly to 4 Strongly disagree)
d058	HUSBAND AND WIFE SHOULD CONTRIBUTE. For each of the following statements I read out, can you tell me how much you agree with each. Do you agree strongly, agree, disagree, or disagree strongly?. Both the husband and wife should contribute to household income. (1 Agree strongly to 4 Strongly disagree)
e023	INTERESTED IN POLITICS. How interested would you say you are in politics? (1 Very interested to 4 Not at all interested)
e025	POLITICAL ACTION: SIGNING A PETITION. Now I'd like you to look at this card. I'm going to read out some different forms of political action that people can take, and I'd like you to tell me, for each one, whether you have actually done any of these things, whether you might do it or would never under any circumstances, do it: signing a petition. (1 Have done to 3 Would never do)
e033	SELF POSITIONING IN POLITICAL SCALE. In political matters, people talk of the left and the right. How would you place your views on this scale, generally speaking? (1 Left to 10 Right)
e035	INCOMES MORE EQUAL. Now I'd like you to tell me your views on various issues. How would you place your views on this scale? 1 means you agree completely with the statement on the left (Incomes should be made more equal); 10 means you agree completely with the statement on the right (We need larger income differences as incentives).
e036	PRIVATE OWNERSHIP OF BUSINESS. Now I'd like you to tell me your views on various issues. How would you place your views on this scale? 1 means you agree completely with the statement on the left (Private ownership of business should be increased). 10 means you agree completely with the statement on the right (Government ownership of business and industry should be increased)
e037	GOVERNMENT MORE RESPONSIBILITY. Now I'd like you to tell me your views on various issues. How would you place your views on this scale? 1 means you agree completely with the statement on the left (People should take more responsibility to provide for themselves).; 10 means you agree completely with the statement on the right (The government should take more responsibility).
e039	COMPETITION IS GOOD. Now I'd like you to tell me your views on various issues. How would you place your views on this scale? 1 means you agree completely with the statement on the left (Competition is good. It stimulates people to work hard and develop new ideas.); 10 means you agree completely with the statement on the right (Competition is harmful. It brings out the worst in people).

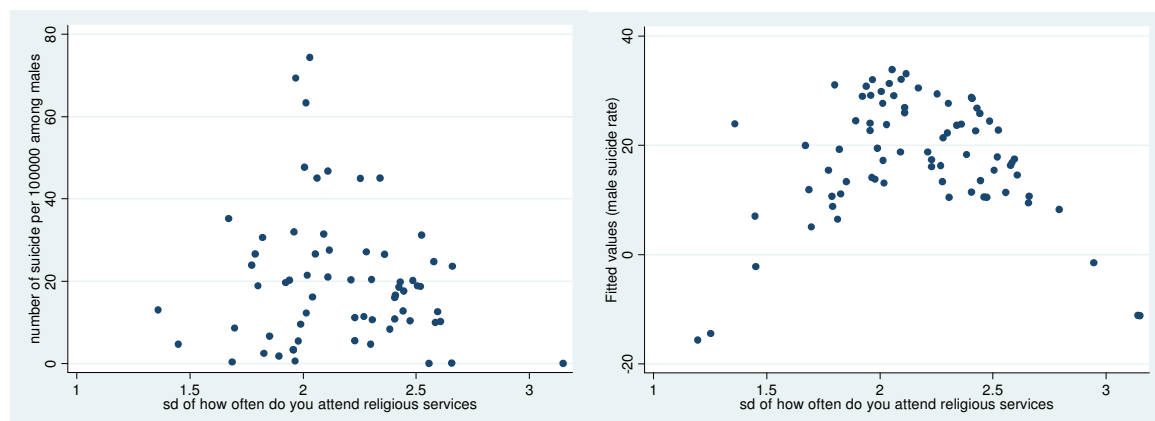
Variable name	Description
e069	CONFIDENCE: CHURCHES. I am going to name a number of organisations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all? The churches.(1 A great to 4 None at all)
e070	CONFIDENCE: ARMED FORCES. I am going to name a number of organisations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all? The armed forces. (1 A great to 4 None at all)
e072	CONFIDENCE: THE PRESS. I am going to name a number of organisations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all? The press. (1 A great to 4 None at all)
e073	CONFIDENCE: LABOR UNIONS. I am going to name a number of organisations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all? Labour unions. (1 A great to 4 None at all)
e074	CONFIDENCE: THE POLICE. I am going to name a number of organisations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all? The police. (1 A great to 4 None at all)
e075	CONFIDENCE: PARLIAMENT. I am going to name a number of organisations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all? Parliament. (1 A great to 4 None at all)
e076	CONFIDENCE: THE CIVIL SERVICES. I am going to name a number of organisations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all? The Civil service. (1 A great to 4 None at all)
e088	CONFIDENCE: THE UNITED NATIONS. I am going to name a number of organisations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all? The United Nations. (1 A great to 4 None at all)
e112	RATE POLITICAL SYSTEM AS IT WAS BEFORE. People have different views about the system for governing this country. Here is a scale for rating how well things are going: 1 means very bad; 10 means very good. Where on this scale would you put the political system as it was before? (1 Bad to 10 Very Good)
e114	HAVING A STRONG LEADER. I'm going to describe various types of political systems and ask what you think about each as a way of governing this country. For each one, would you say it is a very good, fairly good, fairly bad or very bad way of governing this country? Having a strong leader who does not have to bother with parliament and election. (1 Very good to 4 Very bad)
e115	HAVING EXPERTS MAKE DECISIONS. I'm going to describe various types of political systems and ask what you think about each as a way of governing this country. For each one, would you say it is a very good, fairly good, fairly bad or very bad way of governing this country? Having experts, not government, make decisions according to what they think is best for the country. (1 Very good to 4 Very bad)
e116	HAVING THE ARMY RULE. I'm going to describe various types of political systems and ask what you think about each as a way of governing this country. For each one, would you say it is a very good, fairly good, fairly bad or very bad way of governing this country? Having the army rule. (1 Very good to 4 Very bad)
e117	HAVING A DEMOCRATIC POLITICAL SYSTEM. I'm going to describe various types of political systems and ask what you think about each as a way of governing this country. For each one, would you say it is a very good, fairly good, fairly bad or very bad way of governing this country? Having a democratic political system. (1 Very good to 4 Very bad)
e120	IN DEMOCRACY, THE ECONOMIC SYSTEM RUNS BADLY. I'm going to read off some things that people sometimes say about a democratic political system. Could you please tell me if you agree strongly, agree, disagree or disagree strongly, after I read each one of them? In democracy, the economic system runs badly. (1 Agree strongly to 4 Strongly disagree)
e121	DEMOCRACIES ARE INDECISIVE. I'm going to read off some things that people sometimes say about a democratic political system. Could you please tell me if you agree strongly, agree, disagree or disagree strongly, after I read each one of them?. Democracies are indecisive and have too much quibbling. (1 Agree strongly to 4 Strongly disagree)
e122	DEMOCRACIES AREN'T GOOD AT MAINTAINING ORDER. I'm going to read off some things that people sometimes say about a democratic political system. Could you please tell me if you agree strongly, agree, disagree or disagree strongly, after I

Variable name	Description
	read each one of them? Democracies aren't good at maintaining order. (1 Agree strongly to 4 Strongly disagree)
e123	DEMOCRACY MAY HAVE PROBLEMS BUT IS BETTER. I'm going to read off some things that people sometimes say about a democratic political system. Could you please tell me if you agree strongly, agree, disagree or disagree strongly, after I read each one of them? Democracy may have problems but it's better than any other form of government. (1 Agree strongly to 4 Strongly disagree)
e124	RESPECT FOR INDIVIDUAL HUMAN RIGHTS. How much respect is there for individual human rights nowadays (in our country)? Do you feel there is: (1 A lot of respect for individual human rights to 4 Not respect at all)
e143	IMMIGRANT POLICY. How about people from other countries coming here to work. Which one of the following do you think the government should do? Let people come as long as there are jobs available. (1 Let anyone come to 4 Prohibit people coming)
f028	HOW OFTEN DO YOU ATTEND RELIGIOUS SERVICES. Apart from weddings, funerals and christenings, about how often do you attend religious services these day? (1 More than once a week to 8 Never practically never)
f121	JUSTIFIABLE: DIVORCE. Please tell me for each of the following statements whether you think it can always be justified, never be justified, or something in between: Divorce. (1 Never justifiable to 10 Always justifiable)
g001	GEOGRAPHICAL GROUPS BELONG FIRST. To which of these geographical groups would you say you belong first of all?. And the next?. Geographical groups belong first. (1 Locality to 5 The world)

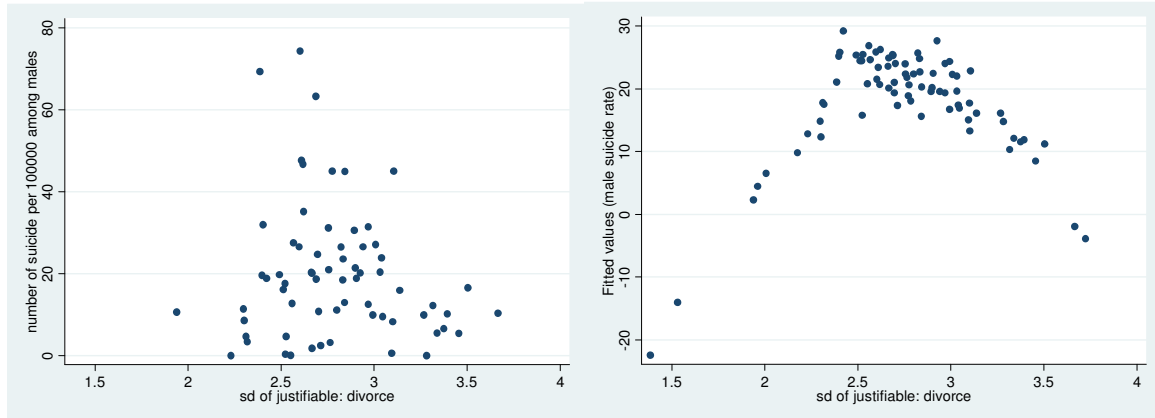
Appendix C



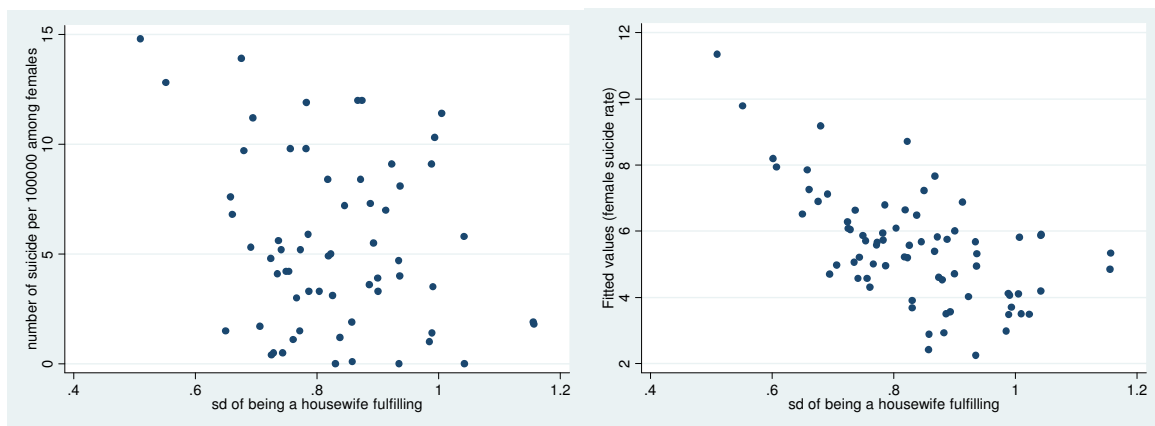
Actual (the graph to the left) and fitted data(the graph to the right) from the male data set for the Government should take responsibility question. Setting $y'=0$ yields $x=2.72$ ($x \min=1.91$, $x \max=3.7$)



Actual (the graph to the left) and fitted data(the graph to the right) from the male data set for the Attend religious services question. Setting $y'=0$ yields $x=2.08$ ($x \min=1.20$, $x \max=3.15$)



Actual (the graph to the left) and fitted data(the graph to the right) from the male data set for the Is divorce justifiable question. Setting $y'=0$ yields $x=2.67$ (x min=1.39, x max=3.72)



Actual (the graph to the left) and fitted data(the graph to the right) from the female data set for the Being a housewife fulfilling question. Setting $y'=0$ yields $x=0.97$ (x min=0.51, x max=1.16)

Appendix D

Geographical division used for robustness checks

Eastern Europe	Western World	Latin America and the Carribbean	Other countries
Armenia	Australia	Argentina	Albania
Azerbaijan	Austria	Brazil	China
Belarus	Belgium	Chile	Egypt
Bosnia and Herzegovina	Canada	Colombia	India
Bulgaria	Denmark	Dominican Republic	Iran
Croatia	Finland	El Salvador	Israel
Czech Republic	France	Mexico	Japan
Estonia	Germany	Peru	Jordan
Georgia	Great Britain	Puerto Rico	Philippines
Hungary	Greece	Uruguay	Singapore
Latvia	Iceland	Venezuela	South Korea
Lithuania	Ireland		Zimbabwe
Macedonia	Italy		
Moldova	Luxembourg		
Poland	Malta		
Romania	Netherlands		
Russia	New Zealand		
Slovakia	Norway		
Slovenia	Portugal		
Ukraine	Spain		
	Sweden		
	Switzerland		
	USA		