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The role of family in suicide rate in Italy

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Abstract

We use national panel data at provincial level to investigate the relationship between suicide rates and socio-economic factors in Italy. The role of family, alcohol consumption, social conformism and population density are the main factors in explaining the suicide rate in Italy. Notably, the high heterogeneity between provinces are not explained by economic fluctuations and call the existence of clear relations between suicides rates and cultural/social correlates. In a further step, we check for the main determinats for the Northern provinces. The findings show that the density population and alcohol abuse play a key role in these provinces.

1. Introduction

Although psychiatric illness seems to be the main determinant of suicide (Barraclough *et al.* 1974, and Roy 1982) and though suicide is considered an irrational behaviour by doctors and psychologists, the quest for those socio-economic factors which may act as precipitating elements, engaged sociologists first and economists later (Preti and Miotto 1999).

In the economic literature scholars tried initially to understand the suicide decision from an individual point of view. Hamermesh and Soss (1974) modelled the decision to suicide through a neoclassical approach: a suicide is a rational agent that opts to end her life when her discounted lifetime utility goes below an established threshold[1]. From this perspective, several economical indicators are believed to have an impact on suicide rates and have been studied by economists, including different measures of income and economic wellness (real GDP per capita, growth of per capita income and (un)employment).

However, studies on the relationship between suicides and economics conditions gave mixed results, especially at an aggregate level. Unemployment and economic welfare (in levels or in changes) are expected to be negatively correlated to suicide rates to the extent that higher income per capita leads to better consumption opportunities (also in terms of health-preserving investments) and to higher happiness; however some authors found an opposite relationship and proposed some alternative hypothesis[2].

First of all, changes of the economic conditions may be associated to structural change and this may generate problems to those do not benefit from that - such as older people – and therefore leading to an increase in their suicide rates (Durkheim 1951). Then, to the extent that suicide is (negatively) correlated with happiness, the relationship between happiness and income per capita is far to be empirically demonstrated (see among others Abramowitz 1979, and Easterlin 2001). Third, in the economic expansion the opportunity cost of leisure time increases, raising the risk of stress and driving down the time for health-preserving activities (for example sport, routine medical check-ups) (Ruhm 2000).

Theoretical foundations for suicidal behaviour have been also investigated from a sociological point of view.

Durkheim's theory of suicide (1951) was based on two assumptions: individuals are characterized by different levels of social norms, and social integration offers protection against suicidal tendencies. From this assumptions Durkheim found in egoism (as the lack of social integration) and anomie (as the lack of regulation) the two principal causes of suicide.

In this vein, suicide is a product of society and cultural values have a profound influence in suicide behaviour. Hence we speculate on a *positive* (negative on suicides) role of social connectors like family and negative role areas characterized by high level of social marginalization.

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[1] Marcotte (2003) extended the Hamermesh and Soss (1974) framework with nonfatal suicide attempts.
[2] See also Jungeilges and Kirchgassner (2002) and Neumayer (2004) for a broader discussion on counter-intuitive results.

If the existing literature tried to bridge the gap between sociological and economical explanations (Huang 2006, and Yamamura 2010), however, the empirical results are not necessarily always robust and valid across different cultures and countries.

This paper contributes to the literature by evaluating empirically the determinants of suicide in Italy, looking both at economic and sociological aspects, at the Province level, from 1996 to 2005.

The empirical strategy followed is to take from the literature briefly discussed the driving forced that are expected to affect suicide rates. Economic variables considered are the per capita GDP (level and growth) and the unemployment rate; the socio-demographic variables are the number of divorces and marriages, the average number of individuals per households, the average consumption of alcohol and drugs, the level of cultural convention, the population density and the average number of births. We also control for age groups and gender.

In the reminder of the paper, we first we briefly illustrate the principal figures for the Italian case. Then, in Section 3 we present the data and the econometric model. Section 4 discusses the results. Section 5 concludes.

2. Suicides in Italy

Italy is characterized by a culture that is less favourable toward suicide than that of countries with non-Christian roots, such as Japan for example. According to Pescosolido-Georgiana (1989), cults and especially Catholicism, *offer a high level of integration to individuals facing personal crises, all other things being equal.* In this sense we speculate on the limited role of economic factors in a country with strong social capital and religious ties. However, Italian society, historically family-based and conservative, could also generate social tensions and marginalisation that might lead to suicidal behaviour.

Like other Mediterranean countries such as Spain and Greece, Italy presents a low level of suicide rates (for an international comparison see among others Andrés 2005, Chen *et al.* 2009, and Noh 2009)[3]. Moreover, Italy has experienced a decreasing trend in the suicide ratio between 1996 and 2005, as shown in Figure 1, which illustrates the number of suicides per 100,000 inhabitants.

The overall figures hide an inhomogeneous picture among different regions and municipalities in Italy. As shown in Figure 2, the northern part of Italy presents higher levels of suicide than the southern part of the country, suggesting that the factors affecting suicide decisions may be different in the two areas. The two extreme cases are Napoli with 1.78 suicides per 100,000 inhabitants (average, 1996-2005) and Trieste with 16.66 suicides.

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[3] For further investigations see WHO (World Health Organisation) mortality database
(http://www.who.int/healthinfo/morttables/en/)

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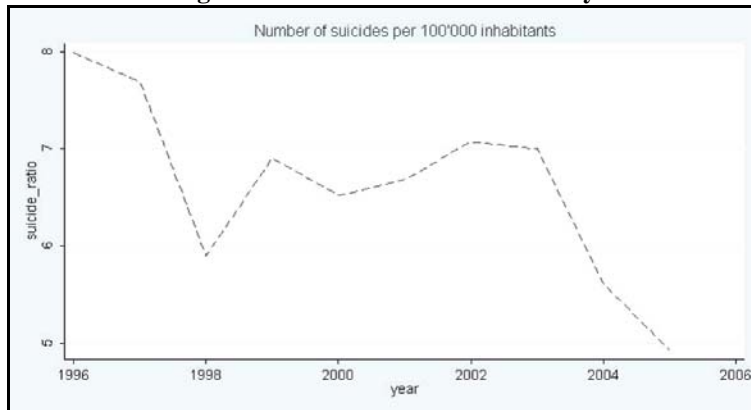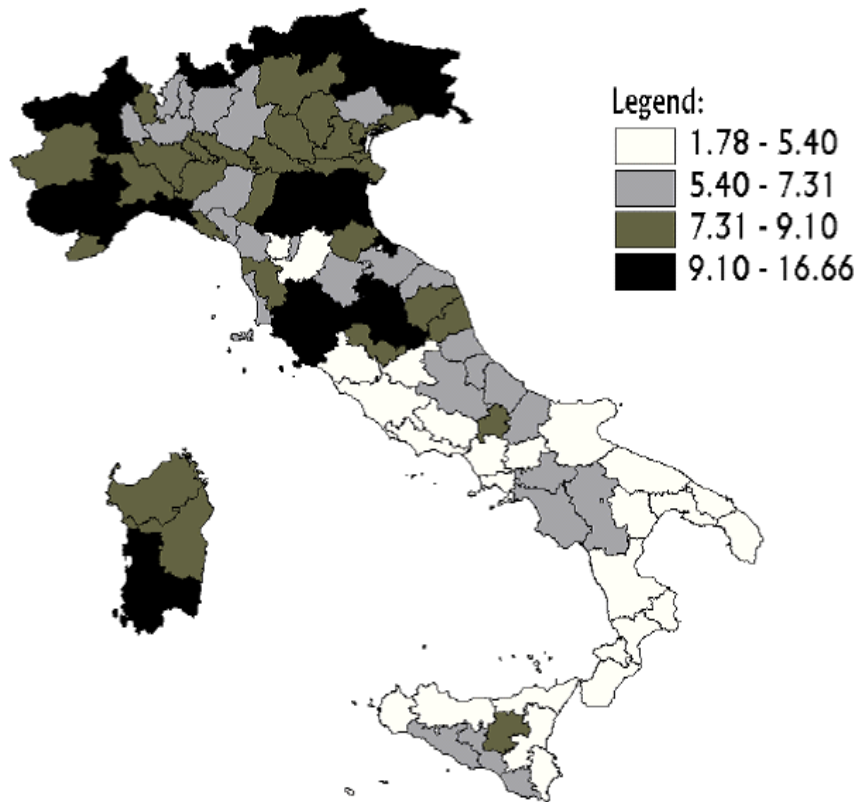**Figure 1. Number of suicides in Italy**

Figure 2. Average number of suicides per 100,000 inhabitants in Italy (1996-2005)

3. Data description and empirical model

Following Yamamura (2010), who analyses the relationship between suicide rate and a set of socio-economic factors in Japan, the paper proposes the following empirical specification:

$$\begin{aligned}
SUICIDE_{it} = {} & \beta_1 + \beta_2\,GROWTH_{it} + \beta_3\,INCOME_{it} + \beta_4\,UNEMPLOYMENT_{it} + \\
& \beta_5\,DIVORCE_{it} + \beta_6\,MARRIAGE_{it} + \beta_7\,FAMILY\_SIZE_{it} + \beta_8\,DENSITY_{it} + \\
& \beta_9\,BIRTH_{it} + \beta_{10}\,ALCOHOL_{it} + \beta_{11}\,DRUG_{it} + \beta_{12}\,CONFORMISM_{it} + \\
& \beta_{13}\,SOCIALFUND_{it} + \beta_{14}\,AGE\_1_{it} + \beta_{15}\,AGE\_2_{it} + \beta_{16}\,AGE\_3_{it} + \\
& \beta_{17}\,MALE_{it} + u_{it}
\end{aligned} \tag{1}$$

where $SUICIDE_{it}$ indicates the number of committed suicides per 100 thousands inhabitants in the i-th province at year t. The study employs data from 103 provinces for the time span between 1996 and 2005. *GROWTH, INCOME* and *UNEMPLOYMENT* represent the real economic growth, real income per capita and unemployment rate, respectively. They describe the economic condition in the i-th province at time t.
DIVORCE, *MARRIAGE* and FAMILY_SIZE are the number of divorces, marriages and individuals per household, respectively. Neumayer (2003) and Yamamura (2010) found that higher number and size of families are associated with lower suicide rate.

DENSITY is the number of inhabitants per squared kilometre, while BIRTH is the number of births per 100,000 residents. The former controls for the agglomeration effect of population; the latter is a proxy of the fertility rate and its expected sign is negative. We expect that higher fertility rate leads to higher voluntary social cohesion reduceing the incentive to suicide.
ALCOHOL and DRUG indicate the share of people that consume alcohol between meals and the number of drug dealing offences per 100,000 inhabitants; positive signs are expected.

CONFORMISM is the ratio of religious marriages over the total number per province and year. Since religious sentiment is similarly distributed in the whole country, such a variable stands for a proxy of the degree of social convention. A number of social practises and rituals are generally accepted by many individuals in order to not violate the system of rule in which they live. Such behavior is caused by fear (and risk) that conducts contrary to the mainstreaming could lead to their exclusion or marginalization.
In this view, CONFORMISM is inserted in the model in order to capture such social aspects, to the extent that this index is correlated to the level of social convention. We expect a positive sign of this variable, i.e. the higher the percentage of religious marriages, the higher the value of committed suicide per capita.

SOCIALFUND indicates the amount of per capita resources that local governments allocate for direct social programs, such as combating poverty and social exclusion. The expected sign is negative.

AGE_1, AGE_2, AGE_3 and MALE refers to the demographic structure of each province; Precisely, AGE1, AGE2 and AGE3 represent the share of population aged 20-39, 40-79 and 80 and over, respectively. As pointed out by Shah (2007), an increase in the propensity to commit a suicide with increasing age is observed; accordingly, we expect that high proportion of older people in a given province is associated to high level of suicide per capita. MALE indicates the percentage of male in a given province: as well known in the empirical literature, male suicide rates are higher than femile ones. So, a positive coefficient is expected.

Table 1. Descriptive statistics (Observations = 1,030)

	Mean	Mean (North)	Std. Dev.	Min	Max
SUICIDES	7.58	9.43	3.61	0.00	23.32
GROWTH	0.01	0.01	0.03	-0.48	0.12
INCOME	15,393.67	18,653.66	4,005.42	7,119.16	26,452.31
UNEMPLOYMENT	0.09	0.05	0.07	0.02	0.03
DIVORCE	129.24	159.84	56.37	0.17	441.93
MARRIAGE	456.30	426.72	65.33	232.20	978.42
FAMILY_SIZE	2.57	2.41	0.23	1.99	3.20
DENSITY	244.30	277.21	330.80	36.54	2,661.62
BIRTH	885.37	851.56	135.15	565.03	1,412.48
ALCOHOL	0.25	0.31	0.07	0.11	0.55
DRUG	57.68	55.20	45.19	10.30	907.70
CONFORMISM	0.74	0.66	0.12	0.41	0.94
SOCIALFUND	0.33	0.31	0.62	0.00	2.73
AGE_1	0.29	0.29	0.01	0.25	0.32
AGE_2	0.32	0.34	0.02	0.29	0.35
AGE_3	0.05	0.05	0.01	0.02	0.07
MALE	0.49	0.48	0.01	0.47	0.50
NORTH	0.47	1.00	0.50	0.00	1.00

In order to explore the main factors of suicide in the Northern provinces of Italy, we run a specific model in which all variables are interacted with the dummy variable NORTH, which values one if a province is located in the north of Italy and zero otherwise. As

shown in the second section and in figure 1, high values of suicide per capita are observed in the North, depecting subtantial and structural differences, in terms of socio-economic condition, of such area with respect to the rest of Italy. Table 1 represents some descriptive statistics of the variables under study; the average level of suicide per capita, along with INCOME, DIVORCE, ALCOHOL and DENSITY, are higher in the Northern provinces than in the rest of the country. UNEMPLOYMENT, FAMILY_SIZE and CONFORMISM are substantially lower in the North.

All data come from National Statistical Office of Italy (ISTAT), except for the economic variables that come from Istituto Tagliacarne. All variables are transformed in logarithm term, so the coefficients can be interpreted as elasticities.

4. Results and discussion

The results are provided in Table 2. Columns (1) and (2) show the output of model (1) based on whether or not the variable GROWTH is inserted. The results in columns (3)-(4) refer to the model in which all explanatory variables in equation (1) are interacted with the dummy variable NORTH, in order to estimate which factors are the most relevant in explaining the suicide rate in the Northern Italian provinces. The random-effects estimator is selected according to the Hausman test statistics. Furthermore, robust standard errors are performed in order to avoid heteroskedasticity problems.

As shown in Table 2, the economic variables are not significant in all regressions. Revaluating the model (1) by entering the economic variables one at a time, we can say that this result appears not to be driven by multicollinearity problems between the variables in use. As Preti-Miotto (1999) argued, there are still concerns in the economic literature regarding the relationship between suicide decisions and economic conditions. Furthermore, Kunce and Anderson (2002) showed that at an aggregate level there is no strong evidence that economic factors have a causal relationship with suicide decisions.

The MARRIAGE and FAMILY_SIZE coefficients are significant and negative; precisely, one percent increase in the number of marriages and in the average number of individuals per houasehold leads to a decrease in suicide rate by 0.44% and 1.63%, respectively. Marriage and family size are expected to lead to an increase of social integration as they involve the creation of new and larger families and stronger social ties (Chuang and Huang 1997). Divorces work in the opposite direction because it is a factor of social disruption: DIVORCE coefficient has the expected positive sign but it is not significant. As in Yamamura (2010), the coefficient of the number of birth per capita (BIRTH) has an unexpected positive sign, but in our case it is not significant.

Table 2. Regression results on suicide

VARIABLES	(1)	(2)	(3)	(4)
GROWTH		0.13		0.32
		(0.34)		(0.42)
INCOME	-0.05	-0.07	-0.10	-0.14
	(0.18)	(0.19)	(0.26)	(0.29)
UNEMPLOYMENT	-0.01	-0.00	0.01	0.00
	(0.05)	(0.05)	(0.09)	(0.09)
DIVORCE	0.01	0.01	0.03	0.04
	(0.02)	(0.02)	(0.06)	(0.06)
MARRIAGE	-0.44**	-0.44**	-0.41	-0.42
	(0.17)	(0.17)	(0.27)	(0.27)
FAMILY_SIZE	-1.63***	-1.64***	-0.82	-0.80
	(0.59)	(0.59)	(0.85)	(0.85)
DENSITY	-0.16***	-0.16***	-0.28***	-0.28***
	(0.05)	(0.05)	(0.09)	(0.09)
BIRTH	0.10	0.11	0.18	0.19
	(0.25)	(0.25)	(0.34)	(0.34)
ALCOHOL	0.34**	0.33**	-0.09	-0.09
	(0.15)	(0.15)	(0.27)	(0.27)
CONFORMISM	0.27***	0.27***	0.32***	0.32***
	(0.10)	(0.10)	(0.10)	(0.10)
DRUG	0.04	0.04	0.030	0.03
	(0.03)	(0.03)	(0.05)	(0.05)
SOCIALFUND	-0.09	-0.09	-0.16	-0.16
	(0.08)	(0.08)	(0.11)	(0.11)
AGE_1	0.84	0.89	1.29	1.34
	(1.41)	(1.42)	(2.47)	(2.45)
AGE_2	1.88*	1.93*	3.02*	3.16*
	(1.13)	(1.15)	(1.66)	(1.68)
AGE_3	0.21	0.22	0.31	0.33
	(0.32)	(0.32)	(0.57)	(0.57)
MALE	0.24	0.26	0.40	0.31
	(2.96)	(2.96)	(4.86)	(4.84)
GROWTH*NORTH				-0.53
				(0.67)
INCOME*NORTH			-0.35	-0.27
			(0.42)	(0.46)
UNEMPLOYMENT*NORTH			0.03	0.04
			(0.11)	(0.11)
DIVORCE*NORTH			-0.03	-0.03
			(0.06)	(0.06)
MARRIAGE*NORTH			-0.08	-0.06
			(0.29)	(0.30)
FAMILY_SIZE*NORTH			0.10	0.13
			(0.95)	(0.95)
DENSITY*NORTH			0.18*	0.18*
			(0.10)	(0.10)
BIRTH*NORTH			0.024	0.011
			(0.47)	(0.47)
ALCOHOL*NORTH			0.70**	0.70**
			(0.29)	(0.29)
CONFORMISM*NORTH			-0.14	-0.13
			(0.23)	(0.23)
DRUG*NORTH			0.18	0.18
			(0.15)	(0.15)
SOCIALFUND*NORTH			0.04	0.04
			(0.07)	(0.07)
AGE_1*NORTH			-0.79	-0.91
			(2.89)	(2.88)
AGE_2*NORTH			-3.00	-3.10
			(2.23)	(2.22)
AGE_3*NORTH			0.23	0.21
			(0.67)	(0.67)
MALE*NORTH			-0.96	-0.94
			(5.63)	(5.62)
NORTH			-4.55	-5.64
			(7.69)	(7.97)
CONSTANT	8.12**	8.40**	10.8*	11.3**
	(3.81)	(3.90)	(5.55)	(5.67)
Observations	1,030	1,030	1,030	1,030
Number of provinces	103	103	103	103
R^2	0.65	0.65	0.66	0.66

Robust standard errors are in parenthesis. *, ** and *** indicate significance at the 10%, 5% and 1%, respectively. North Regions: Aosta Valley, Emilia-Romagna, Friuli-Venezia-Giulia, Liguria, Piedmont, Trentino-Sudtirol, Veneto.

DENSITY is significant and negative in all specifications. At the national level, an increase by 1% in the density of population reduces the suicide rate by 0.16%. Such result is not surprising because in Italy the suicide rate is higher in medium-small sized cities than in big municipalities (see Figure 2). Probably, the social ties and constraints are stronger in small communities than in large ones, causing higher levels of suicide. As indicated in columns 3 and 4 on Table 2, DENSITY is still negative in the Northern provinces but its magnitude is lower (the interaction coefficient is 0.18). Migration and urbanisation are historically well diffused in the all the Northern regions of Italy, which implies a similar social habitat between big and medium-size cities.

The consumption of drug and alcohol affects the attitude toward suicide, although only ALCOHOL is significant (0.34). Probably, the underreporting problem, caused by police inefficiency and individual propensity to report, is not equally distribuited among the provinces, affecting the significance of DRUG coefficient. For what concerns ALCOHOL, we notice (columns 3 and 4 in Table 2) that alcohol abuse has its main effect in the North of Italy (the coefficient of the interaction variable, ALCOHOL*NORTH, values 0.70), where a higher level of consumption is historically observed.

As discussed in the previous section, CONFORMISM has the expected positive sign. It is remarkable to remember that this variable is measured as the ratio of religious marriages over the total number per province and hence it may be also interpreted as an index of religiosity. In this latter case we would obtain results contrasting most of the literature, where religious sentiment tends to be often associated with suicides (Kranitz 1968, Breault and Barkley 1982, Comstock and Patridge 1972, and Stack 1983). However we think that the relationship between religiosity and suicides is spurious to the extent that religious sentiment is itself determined by (not observable) individual and social characteristics which are in turn correlated with the propensity to suicide: among people who are not predisposed to suicides, religious behaviors (such as church attendance) are a possible outcome.

SOCIALFUND has the expected sign (as in Minoiu and Andrés 2008) but is not significant in all regressions. Unfortunately, such variable may be endogenous. In fact, high suicide rates could cause higher amounts of resources to be spent in social programs. Therefore, the SOCIALFUND coefficient could be downward biased and inconsistent.

Interestingly, AGE_2 is positive and significant: high portion of people aged 40-79 increases the number of suicides in a given province. MALE is not significant, although it presents the expected sign because men are more likely to suicide than women (WHO 2004).

5. Conclusions

This paper analyzes the socioeconomic determinants of suicide rates in Italy, at the province level, from 1996 to 2005.

Exploring both economic and social explanations, we find only the latter being strong predictors for the suicide rates in Italy. In particular, while unemployment and income seem to be insignificant, the number of marriages and the size of family negatively affect the suicide rate.

For what concerns the other correlates, population density shows a negative effect – although lower in the Northern provinces – while alcohol consumption a positive one. Religious marriages share, taken here as a proxy of "social conformism", increases suicide rate.

These results suggest that the high heterogeneity between provinces are not explained by economic fluctuations and call the existence of clear relations between suicides rates and cultural/social correlates.

Finally, controlling for the structural differences between the North and the South of Italy, we observe that the abuse of alcohol consumption is particularly relevant in the North, while the effect of density is more marked in the Centre-South.

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