

# **Social Leisure and Suicide Rates in Russia: Evidence from Regional Panel Data**

Over the last decades suicide and suicidal behavior have become a major health concern in developing countries. A recent report by WHO (2012) documents that 75% of deaths caused by suicide occurs in developing countries.

Therefore, understanding the antecedents of suicide rates has been an important object of research in social sciences (Neumayer, 2003; Andres et al., 2011). These include demographic changes (Zhang, 1998; Bhandarkar and Shah, 2008), religiosity (Stack, 1983) and socio-economic factors (Yang et al., 2011; Noh, 2009).

However, little attention has been paid to the impact of social leisure on suicide rates in transition countries. Several arguments are in favor of positive effect of social leisure on reduction in suicide rates.

First, social leisure induces momentary benefits such as positive mood, short-term wellbeing together with continuing influence on mental health and increasing life satisfaction (Argyle, 1996; Lu and Hu, 2005). In the same line, Beard and Ragheb (1980) argue that leisure generates several facets of well-being: psychological, socialization, literacy, knowledge and beauty.

Second, leisure-stress coping literature suggests that social involvement generated by leisure can insure against stress (Coleman and Iso-Ahola, 1993) and restore vital resources (Zijlstra and Sonnentag, 2006).

In this study we investigate the effect of social leisure on suicide rates for Russia for the period 1999-2008. We provide estimates from fixed effects model and generalized methods of moments (GMM). While fixed effects regression controls for potential omitted variable bias, GMM allows us to address the endogeneity issues.

To that end, we use two conventional measures of social leisure: (i) per capita theater visits and (ii) per capita cinema visits. Our findings show that the implied effect of theater visits on suicide rates is negative and significant.

The rest of the paper has the following structure: Section 2 describes the data and methodology, Section 3 presents econometric results and Section 4 concludes the paper.

## **2. Data**

The data in this study is from Federal State Statistics Service (FSSS) of Russian Federation. The dependent variable in this study is number of suicides per 100,000 people for the period 1999-2008.

To test the impact of social leisure on suicide rates we use theater visits per 100,000 people and cinema visits per 100,000 people (Konlaan et al., 2000).

As regards the control variables, our study considers lagged suicide rates, fertility rate, unemployment rate and gross regional product as a proxy for regional wealth since they are likely to be determinants of suicide rates (see Myron, 1980; Andrés and Halicioglu, 2010, Milner et al., 2011).

The descriptive statistics are presented in Table 1a and correlation matrix in Table 1b.

**Table 1a. Descriptive statistics**

Variable	Mean	S.D.
Suicide per 100 000 people	32.474	16.671
Theater visits per 100 0 people	0.425	0.465
Cinema visits per 100 0 people	0.172	0.091
Unemployment rate (%)	9.975	6.512

Fertility rate per 100 000 women	100.37	20.340
Divorce rate (%)	4.671	1.485
Wealth, '000 RUB	87.424	92.678

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Table 1b. Correlation Matrix

	sui ci de	theatre	ci nema	unem	fert	di vorce	grpcap
sui ci de	1. 0000						
theatre	-0. 0911	1. 0000					
ci nema	-0. 0834	0. 5316	1. 0000				
unem	-0. 0139	-0. 2770	-0. 2968	1. 0000			
fert	0. 4309	-0. 3273	-0. 4062	0. 4363	1. 0000		
di vorce	0. 1068	0. 1188	0. 1617	-0. 4869	-0. 2306	1. 0000	
grpcap	-0. 2125	0. 1128	0. 1871	-0. 3098	-0. 1927	0. 2226	1. 0000

### 3. Methods

The following empirical specification is estimated:

$$S_{i,t} = \beta_1 S_{i,t-1} + \beta_2 SL_{i,t} + X'_{i,t} \beta + \beta_i + \beta_t + \varepsilon_{i,t} \quad (1)$$

where S is the suicide rates in region i in year t, SL is one of the measures of social leisure, X is a vector of control variables,  $\beta_i$  and  $\beta_t$  are region and year fixed effects,  $\varepsilon$  is an error term.

To control for unobserved heterogeneity and omitted variable that is constant over time equation (1) is at first estimated with a fixed-effects estimator on annual data. Yet presence of lagged dependent variable as a control variable on the right hand side means that estimates may not be consistent. To address this issue we rely on generalized methods of moments (GMM) developed by Arellano and Bond (1991) and Arellano and Bover (1995). GMM is econometric technique that allows to reduce the biases produced by measurement errors and by unobserved region-specific effects. Moreover, Wooldridge (2001) argues that GMM method is more efficient compared to IV regression in the presence of heteroskedasticity.

## Preliminary results

Preliminary results in Table 2 indicate that theater visits and cinema in the pooled regression. In column 1 and 2 I include time dummies. Without control variables, the models explain 8.6 and 10.6 percent of regional variation in suicide rates in Russia.

Table 2. OLS regression results

	(1)	(2)
theatre	-2.372*** (0.779)	
cinema		-12.613** (6.091)
_cons	39.076*** (1.740)	39.603*** (2.038)
<i>N</i>	790	750
adj. <i>R</i> <sup>2</sup>	0.086	0.106

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Note: Year dummies are included but not reported

**Further steps:** As it can be seen in the primary statistical analysis and in Table 2 theater and cinema visits are negatively correlation with the suicide rates and signs enter according to our expectation. However low R2 indicates that the models paper must be improved for omitted variable bias, other functional specifications and heteroskedasticity prior to concluding policy recommendation. The primary results strongly convince that the research purpose is achievable.

**Interpretation and recommendations:** all the results will be interpreted exclusively for the Russia and post soviet countries with the current trends in the socio economic development of these countries.

**Beneficiaries.** The result of this research would be useful for both policy and academic audiences, particularly for public health institutions, NGO in transition countries.

## References

Andrés Antonio R., Ferda Halicioglu (2010) Determinants of suicides in Denmark: Evidence from time series data. *Health Policy* 98 (2010) 263–269

Argyle, M. (1996). *The social psychology of leisure*. London: Penguin Books.

Antonio R. Andrés, Ferda Halicioglu, Eiji Yamamura, Socio-economic determinants of suicide in Japan, (2011) *The Journal of Socio-Economics*, 40 (6), 723-731

Arellano, Manuel, Bond, Stephen, 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* 58 (2), 277–297.

Arellano, Manuel, Bover, Olympia, 1995. Another Look at the Instrumental Variable Estimation of Error-Components Models”. *Journal of Econometrics* 68 (1), 29–51.

Beard, J. G., and Ragheb, M. G. (1980). Measuring leisure satisfaction. *Journal of Leisure Research*, 12, 20–33.

Bhandarkar R, Shah A (2008) Association of general population suicide rates with fertility rates: a test of fertility as a measure of social integration. *Psychol Rep* 103:812–818

Coleman, D., & Iso-Ahola, S.E. (1993). Leisure and health: The role of social support and self-determination. *Journal of Leisure Research*, 25(2), 111-128.

Boinkum B Konlaan, Lars O Bygren and Sven-Erik Johansson (2000) Visiting the cinema, concerts, museums or art exhibitions as determinant of survival: a Swedish fourteen-year cohort follow-up. *Scandinavian Journal of Public Health* 28: 174±178

Lu, L., and Hu, C. H. (2005). Personality, leisure experiences and happiness. *Journal of Happiness Studies*, 6,325–42.

Allison Milner, Rod McClure, Jing Sun, Diego De Leo (2011) Globalisation and suicide: An empirical investigation in 35 countries over the period 1980–2006. *Health & Place* 17 (2011) 996–1003

Boor, Myron. "Relationships between unemployment rates and suicide rates in eight countries, 1962-1976." *Psychological Reports* 47.3f (1980): 1095-1101.

Neumayer Eric (2003) Are Socioeconomic Factors Valid Determinants of Suicide? Controlling for National Cultures of Suicide with Fixed-Effects Estimation. *Cross-Cultural Research* 2003 37: 307

Noh Yong-Hwan (2009) Does unemployment increase suicide rates? The OECD panel evidence. *Journal of Economic Psychology* 30 (2009) 575–582

Okada Keisuke, Samreth, Sovannroeun (2013) A study on the socio-economic determinants of suicide: Evidence from 13 European OECD countries. *The Journal of Socio-Economics* 45 (2013) 78–85

Ruhm, Christopher J., 2000. Are recessions good for your health? *Quarterly Journal of Economics* 115 (2), 617–650.

Stack, S. (1983). A comparative analysis of suicide and religiosity. *The Journal of Social Psychology* 119, 285-286

WHO. (2012). "Suicide prevention." from [http://www.who.int/mental\\_health/prevention/en/](http://www.who.int/mental_health/prevention/en/)

Wooldridge, J. M. (2001) Applications of generalized method of moments estimation, *Journal of Economic Perspectives*, 15, 87–100.

Yang, Albert C., Tsai, Shi-Jen, Huang, Norden E. (2011) Decomposing the association of completed suicide with air pollution, weather, and unemployment data at different time scales. *Journal of Affective Disorders*, Vol. 129, Issues 1-3, p275–281

Zhang, J. (1998). Suicide in the world: Toward a population increase theory of suicide. *Death Studies*, 22, 525–539.

Zijlstra, F.R.H. & Sonnentag, S. After work is done: Psychological perspectives on recovery from work. *European Journal of Work and Organizational Psychology*, 2006, 15,129–38.

## Research Plan/Timetable

<b>Works</b>	<b>Period</b>	<b>Results</b>
1. Collection of statistical data and the formation of a comparable time series and panel data to test the basic hypothesis.	1 month	Rows of socio-economic indicators, comparability study, the primary statistical analysis.
2. Primary analysis of data normalization of data for sample uniformity	1 month	
3. Primary statistical analysis (matrix of correlations, descriptive statistics and graphical analysis)	1 month	
4. Economic modeling and primary econometric results, Fixed Effects, Random Effects, Pooled OLS and GMM	1 month	Analytical report
5. Econometric post estimation tests		
6. Generalization of the results of econometric studies and the formation models of the impact of social leisure on suicide rates in Russia	2 months.	Analytical report describing the model.
5. Conclusion, discussions and policy recommendation	3 months	Final report