

Approach in a nutshell

Estimating a utility function with terrorism and income as arguments

→ Marginal utility of income and marginal disutility of terrorism

→ $MRS_{income, terrorism}$

→ Relevant welfare measures (compensating surplus and compensating variation)

Effect of terrorism

- measured for France, Ireland and the United Kingdom
- identified in a combined cross-section and time-series analysis

Data

Euro-Barometer Survey Series

Cross-section sample of Europeans

Waves from the years 1973 to 1998

~ 137,000 observations for F, IE and UK

– Life satisfaction

“On the whole, are you very satisfied [4], fairly satisfied [3], not very satisfied [2], or not at all satisfied [1] with the life you lead?”

– Income

Between 6 and 15 classes of household income → midpoint values

– Control variables: set of personal characteristics

Euro-Barometer Survey Series

RAND Chronology of Int. Terrorism

Int. Institute for Counter-Terrorism

Sutton (1994) and updated index

} # of incidents in France (per region/year)

} # of incidents in UK (per region/year)

} # of fatalities in IE and UK (per region/year)

Empirical Strategy

Specification of the micro-econometric happiness function:

$$\textit{Life satisfaction}_{itr} = \beta_0 + \beta_1 \textit{terrorism}_{tr} + \beta_2 \ln(\textit{income}_{itr}) + \beta_3 \bar{Z}_{itr} + \beta_4 D_t + \beta_5 D_r + \varepsilon_{itr}$$

where *life satisfaction*_{itr} : life satisfaction of individual *i* living in region *r* at time *t*

*terrorism*_{tr} : terrorism across regions and time

*income*_{itr} : individual's household income

\bar{Z}_{itr} : set of personal characteristics

D_r and D_t : region and time specific fixed effects

- Alternative specifications tested
- OLS and weighted ordered probit estimations
- Robust standard errors

Complete Results (1)

Dependent Variable	France 1973-98		United Kingdom 1975-98		U.K. and Ireland 1975-98	
Life Satisfaction	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
<i>Terrorism in the area</i>						
Number of incidents (in 10)	-0.028*	-4.03	-0.068*	-3.25		
Number of fatalities (in 100)					-0.077*	-4.00
Size of household	0.218*	17.22	0.144**	16.66	0.128**	17.42
Size of household ^{1/2}	-0.104*	-8.48	-0.077*	-5.72	-0.047*	-4.61
			Reference group			
Female	0.037*	4.31	0.077**	12.00	0.086**	16.37
Age	-0.021*	-11.13	-0.013*	-10.42	-0.013*	-13.09
Age ²	0.000*	12.37	0.000**	12.61	0.000**	15.88
No children						
One child	-0.006	-0.45	-0.023	-1.28	-0.022	-1.68
Two children	0.023	1.33	0.000	0.02	-0.014	-0.90
Three children	0.023	0.81	-0.026	-0.99	-0.029	-1.40
Four children or more	-0.120*	-2.29	0.036	1.44	-0.003	-0.11

To be continued.

Complete Results (2)

Dependent variable	France 1973-98		United Kingdom 1975-98		U.K. and Ireland 1975-98	
Life satisfaction	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
Educational attainment						
at 15 years			Reference group			
at 18 years	0.077	7.20	0.068**	7.56	0.103**	12.54
at 20 years	0.206	15.26	0.152**	11.73	0.187**	14.73
in education	0.191	9.31	0.116**	4.36	0.169**	
in sex			Reference group			
Married	0.073	5.45	0.090**	7.40	0.078**	8.08
Living together	0.004	0.28	0.019	0.88	0.009	0.41
Divorced	-0.148	-6.69	-0.255	-12.68	-0.252	-14.10
Separated	-0.177	-5.36	-0.262	-8.48	-0.322	-12.46
Widowed	-0.085	-4.31	-0.110	-5.45	-0.104	-7.38
Employed			Reference group			
Unemployed	-0.202	-8.63	-0.374	-20.16	-0.445	-23.58
Retired	0.165	9.50	-0.022	-1.64	-0.014	-1.20
Housewife	0.060**	4.72	-0.043	-4.14	-0.045	-5.60
Orthodox joint	0.164	5.98	0.070**	3.52	0.038	1.18

To be continued.

Complete Results (3)

Dependent variable	France 1973-98		United Kingdom 1975-98		U.K. and Ireland 1975-98	
Life satisfaction	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
Living in a rural area			Reference group			
Living in a small town	-0.066*	-5.73	-0.048*		-0.048*	-4.90
Living in a big town	-0.089*	-7.86	-0.110**		-0.120*	-11.47
					Yes	
					Yes	
	1.307*	6.03	2.012**	16.23	2.140*	20.66
		43,231		53,190		93,678
Number of clusters		70		69		69
		0.000		0.000		0.000
		0.07		0.07		0.08

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To be continued.

Basic Results Summarized

Dependent Variable	France 1973-98	United Kingdom 1975-98	U.K. and Ireland 1975-98			
Lifespan	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
<i>Terrorism in the area</i>						
Number of incidents (in 10)	-0.028*	-4.03	-0.068*	-3.25		
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						Yes
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	70		69		69	
	0.000		0.000		0.000	
	0.07		0.07		0.08	

Monetization (1)

Compensating surplus (CS):

$v(\text{income}_0; \text{terrorism}_0) = v(\text{income}_0 - CS; \text{terrorism}_1)$ where $\text{terrorism}_0 > \text{terrorism}_1$

According to the micro-econometric happiness function specified above:

$$CS = \text{income}_0 - e^{\frac{\beta_1 \cdot (\text{terrorism}_0 - \text{terrorism}_1) + \beta_2 \cdot \ln(\text{income}_0)}{\beta_2}}$$

CS is calculated for a reduction of terrorism from ...

- § the level of Paris to the level of the rest of the France
- § the level of London to the level of the rest of Great Britain
- § the level of Northern Ireland to the level of Great Britain and the Ireland

Monetization (2)

	France 1973-98	United Kingdom 1975-98	U. K and Ireland 1975-98
— annual household income	£18,419	£17,409	£15,585
Reduction of terrorism	11.33 attacks	8.22 attacks	87.78 fatalities
Weighted OLS est.			
Compensating surplus (CS)	£2,521	£5,587	£6,375
CS in percent of income			
Weighted ordered probit est			
Compensating surplus (CS)			
CS in percent of income			

Monetization (3) and Concluding Remarks

Results in perspective

- WTP in case of France: comparable to compensations in the US housing and labor markets for violent crime (Blomquist et al. 1998)
- WTP in case of Northern Ireland: reflects the ferocity of the conflict
- Difficulty of assessing terrorism-risk and related factors
 - Prediction of worst-case scenarios (Viscusi and Zeckhauser 2003)
 - Probability neglect (Sunstein 2003)
 - Fear depreciates utility of risky activities (Becker and Rubinstein 2004)

Likely source of error: marginal utility of income

- Long run marginal utility of income (with adaptation) vs. short-run marginal utility of income changes
- Crude income information → coefficient biased towards zero

But: comparison of different goods still possible

Basic results (1)

<i>Region / Country</i>	Job satisfaction (means)		Coefficient on variable “self-employed”	
	Self- employed	Employed	Regression (I)	Regression (II)
<i>Western Europe</i>				
Germany	5.52 (N = 93)	5.12 (N = 892)	0.746** (N = 888)	0.701** (N = 911)
Great Britain	5.40 (N = 82)	5.08 (N = 485)	0.514° (N = 504)	0.579* (N = 560)
France	5.50 (N = 34)	5.06 (N = 653)	0.957** (N = 656)	0.796* (N = 687)
Italy	5.45 (N = 142)	5.06 (N = 321)	0.895** (N = 289)	0.700** (N = 460)
Portugal	5.24 (N = 226)	5.14 (N = 662)	0.267 (N = 846)	0.122 (N = 853)
Switzerland	5.87 (N = 228)	5.43 (N = 1'505)	0.682** (N = 1442)	0.773** (N = 1725)

Basic results (2)

<i>Region / Country</i>	<i>Job satisfaction (means)</i>		<i>Coefficient on variable "self-employed"</i>	
	<i>Self-employed</i>	<i>Employed</i>	<i>Regression (I)</i>	<i>Regression (II)</i>
<i>Western Europe</i>				
<i>Denmark</i>	5.84 (N = 4)5	5.68 (N = 5)93	0.584 (N = 5)81	0.349 (N = 6)35
<i>Norway</i>	5.43 (N = 1)57	5.20 (N = 1)456	0.374* (N = 3)04	0.335* (N = 3)95
<i>Sweden</i>	5.70 (N = 8)6	5.20 (N = 7)28	1.049** (N = 7)28	0.968** (N = 7)68
<i>North America</i>				
<i>United States</i>	5.63 (N = 1)12	5.32 (N = 7)14	0.405° (N = 7)13	0.414* (N = 8)22
<i>Canada</i>	5.44 (N = 9)8	5.06 (N = 5)28	0.500* (N = 4)70	0.512* (N = 5)16

Basic results (3)

<i>Region / Country</i>	Job satisfaction (means)		Coefficient on variable "self-employed"	
	Self-employed	Employed	Regression (I)	Regression (II)
<i>Eastern Europe</i>				
Hungary	5.05 (N = 9)3	4.77 (N = 5)5	0.041 (N = 5)0	0.462* (N = 6)8
Czech Republic	5.63 (N = 5)4	5.06 (N = 4)7	1.026° (N = 3)0	0.889** (N = 5)6
Poland	5.20 (N = 1)9	5.08 (N = 3)2	0.267 (N = 4)9	0.296 (N = 5)7
Bulgaria	5.53 (N = 5)3	4.96 (N = 4)5	0.873** (N = 4)0	0.978** (N = 4)8
Slovakia	5.08 (N = 4)9	4.95 (N = 4)8	0.116 (N = 3)5	0.235 (N = 4)6
Russia	4.95 (N = 8)6	4.84 (N = 7)3	0.306 (N = 6)1	0.216 (N = 8)7

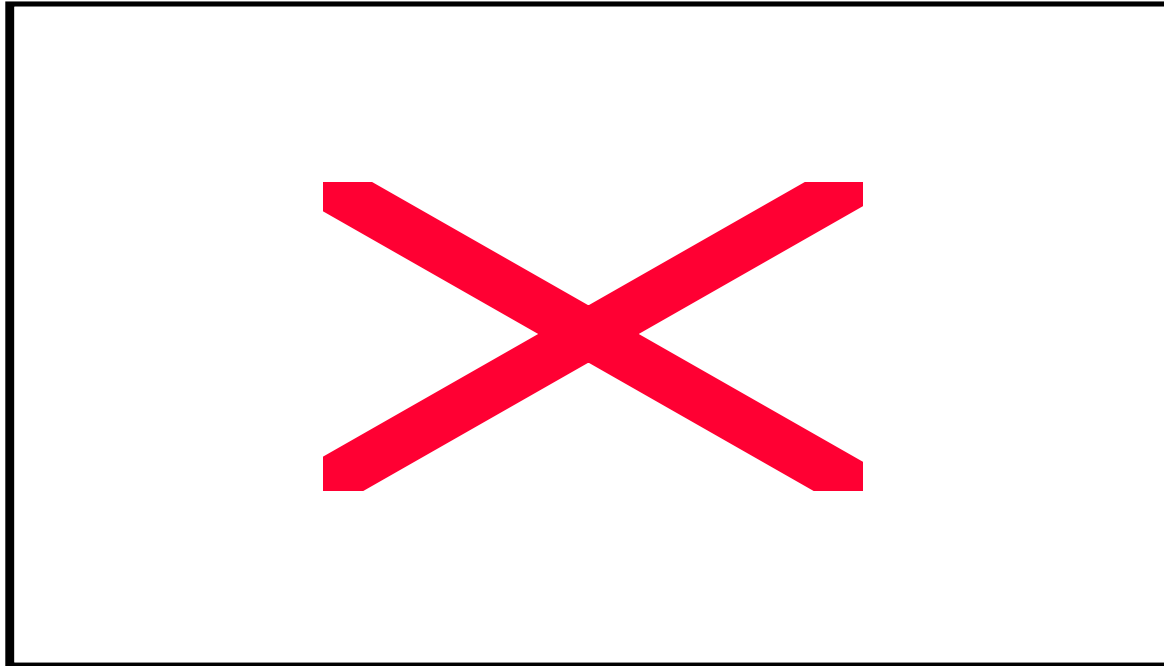
Basic results (4)

<i>Region / Country</i>	Job satisfaction (means)		Coefficient on variable “self-employed”	
	Self- employed	Employed	Regression (I)	Regression (II)
Japan	5.17 (N = 195)	4.74 (N = 517)	0.391° (N = 559)	0.382* (N = 679)
Netherlands	5.32 (N = 66)	5.44 (N = 236)	-0.173 (N = 276)	-0.107 (N = 283)
Cyprus	6.08 (N = 153)	5.50 (N = 423)	1.225** (N = 557)	1.182** (N = 564)
Israel (Jews)	5.91 (N = 93)	5.24 (N = 364)	0.602* (N = 383)	1.004** (N = 454)
Israel (Arabs)	5.72 (N = 46)	5.36 (N = 134)	1.091* (N = 158)	0.951** (N = 174)
Bangladesh	5.43 (N = 53)	5.17 (N = 421)	0.799* (N = 463)	0.897** (N = 474)
The Philippines	5.71 (N = 307)	5.51 (N = 300)	0.142 (N = 482)	0.306° (N = 595)

Variables

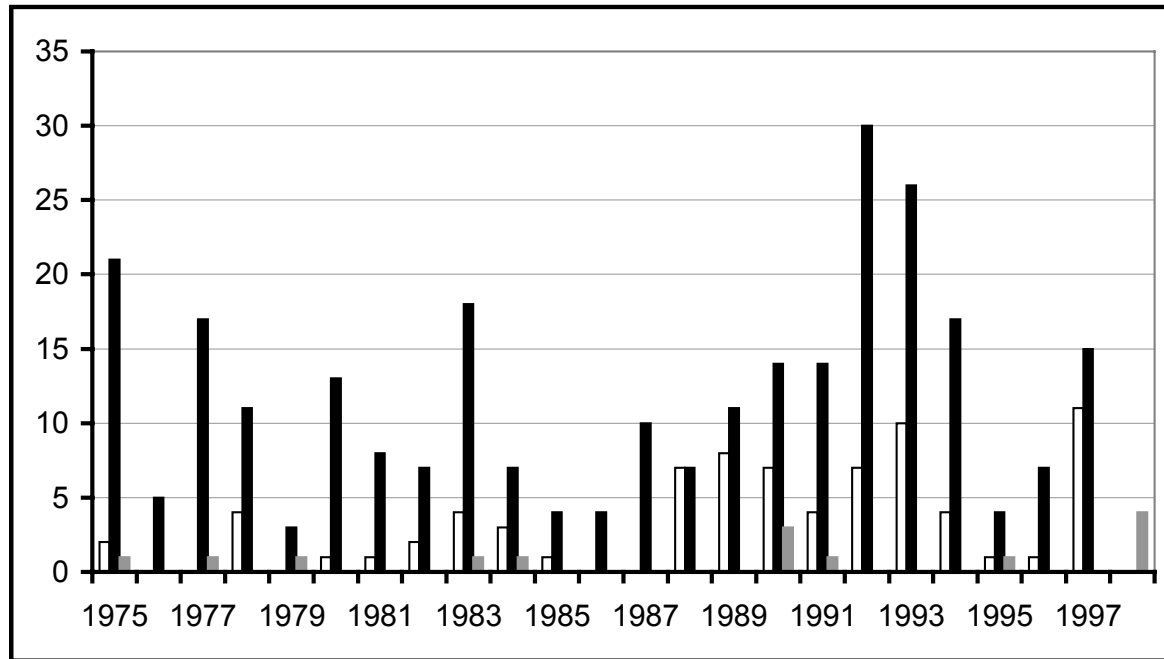
- Dependent variable: *job satisfaction*
 - Question: “How satisfied are you in your (main) job?”
 - Answers on a scale from 1 (“completely dissatisfied”) to 7 (“completely satisfied”)
- Main explanatory variable: *being self-employed*
 - “In your main job, are you an employee or self-employed?”
 - Dummy variable *self-employed* (1=self-employed, 0=employee)
- Information on some important control variables:
 - income, working hours, age, gender, years of education

Data



	Rest of France <input type="checkbox"/>	Paris <input checked="" type="checkbox"/>	Provence-Alpes Côte d'Azur <input checked="" type="checkbox"/>
Mean	4.29	15.63	3.91
Std. Dev.	3.95	14.03	4.23
Min	0	0	0
Max	18	66	17

Data



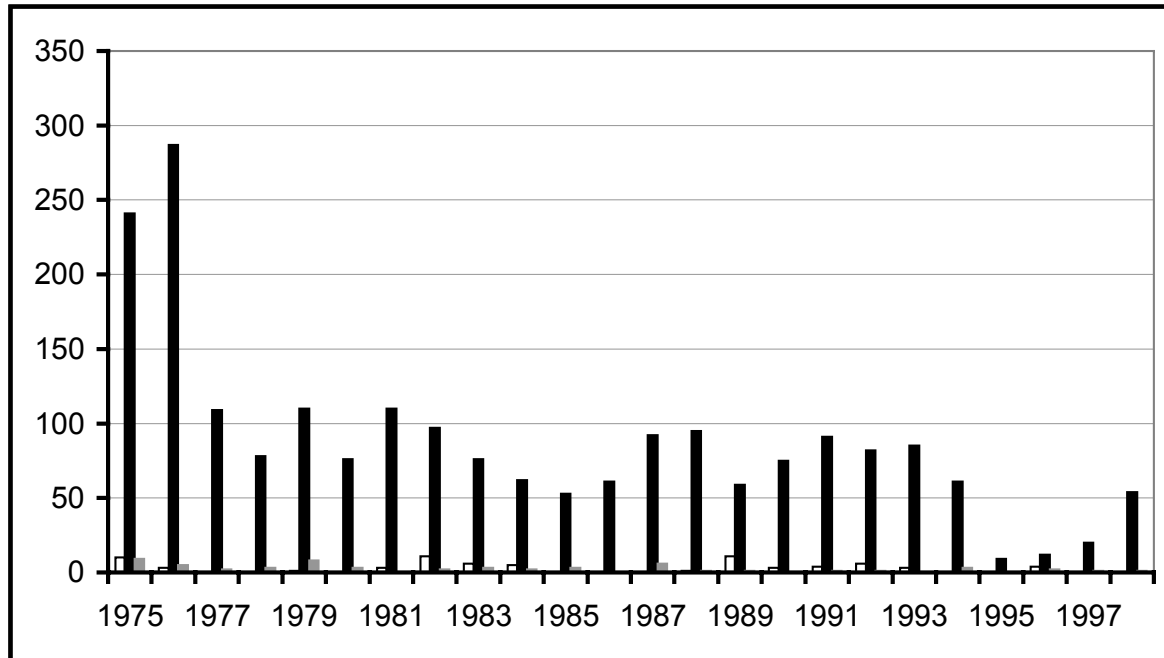
Rest of GB

London

Northern IE

Mean	3.35	11.57	0.61
Std. Dev.	3.43	7.58	1.03
Min	0	0	0
Max	11	30	4

Data



Great Britain Northern IE Republic of IRL

Mean	2.91	90.57	2.67
Std. Dev.	3.68	60.77	2.79
Min	0	9	0
Max	11	287	9

Sensitivity Analysis (1)

Exceptionally high

of incidents in Paris in 1982

of fatalities in Northern Ireland in 1975/76

→ Exclusion of observations: size of coefficients ↑ and statistical significance ↓

Simultaneity of high terrorist activity and bad economic conditions

- Economic situation → terrorist activity: no evidence, at least for the Middle East (Krueger and Malecková 2003)
- Terrorist activity → economic situation: plenty of evidence (see Frey, Luechinger and Stutzer 2004)

Sensitivity Analysis (2)

Dependent Variable	United Kingdom 1975-98		U.K. and Ireland 1975-98	
Life satisfaction	Coefficient	t-value	Coefficient	t-value
<i>Terrorism in dc attacks</i>				
Number of fatalities (in 100)	-0.065**	-3.66		
Number of fatalities (in 100)			-0.111**	-4.68
	0.144**	16.63	0.126**	17.90
	1.100*	2.58	0.330**	2.67
Unemployment rate	-6E-8	-1.22	-2.465*	-2.41
			Yes	
			Yes	
			Yes	
			Yes	
		53,190		93,678
Number of clusters		69		69
		0.000		0.000
		0.07		0.08