

Measuring Wellbeing: Individual Based Approach

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How to measure wellbeing?

- ▶ Since the 1930s, GDP and GNI have been the preferred measure of national/regional economic development
- ▶ Emphasis on material output: market value of goods and services
- ▶ GDP allows straightforward comparison of level of development across regions/countries
- ▶ Measurement issues: informal economy, omissions, domestic production, quality, etc.
- ▶ Inefficient production included: prisons, lawyers and security guards
- ▶ Externalities ignored: pollution, adverse health effects (alcohol, cigarettes), etc.
- ▶ GDP measured at the point of production rather than consumption: regional figures may be skewed

Alternatives to GDP

- ▶ Kuznets (1934): “the welfare of a nation can scarcely be inferred from a measure of national income”.
- ▶ Immaterial outcomes – health, nutrition, education, clean environment, social ties, etc – are crucial determinants of welfare.
- ▶ Leisure: If people work less hard, their welfare goes up even though output falls.
- ▶ A number of alternative indices have been proposed to complement or replace GDP.
- ▶ Human Development Index (UN): Health, education and income.
- ▶ Social Progress Index: Basic human needs, Wellbeing, and Opportunities.

Subjective happiness (2)

- ▶ The only country to systematically monitor happiness is Bhutan
- ▶ Not easily comparable across time (Easterlin paradox)
- ▶ Not clear how it is created (production function) and how it responds to policy interventions
- ▶ Measured by surveys: not available for all countries, years, or levels of aggregation

Our goals

- ▶ Production function of happiness: explain happiness at the individual level, using a combination of individual, regional and national variables.
- ▶ Happiness, as a subjective and abstract outcome, explained by objective and measurable factors.
- ▶ Create an indicator of 'predicted happiness' at the regional (and national) level.
- ▶ Only objectively measurable variables used: predicted happiness can be computed for any level of aggregation as long as data are available.
- ▶ This indicator can be used for policy-impact analysis or as an input for policy decisions: support for least developed regions, allocation of EU funds, etc.

- ▶ Source of individual data: European Social Survey (ESS)
 - ▶ 4 rounds: 2008-2014
 - ▶ All EU countries + Switzerland + Norway + Iceland
 - ▶ **Taking all things together, how happy would you say you are?** (0 – extremely unhappy; 10 – extremely happy)
- ▶ Source of regional data: Eurostat

Individual factors - subjective

- ▶ Health (Self reported health)
- ▶ Discrimination (Would you describe yourself as a member of a discriminated group?)
- ▶ Safety (How safe would you feel walking alone in this area after dark?)
- ▶ Trust and satisfaction (trust in: parliament, legal system, police, politicians; and satisfaction with: economy, government, democracy, education, health services)

Regional factors

- ▶ Average disposable income of household in the region divided by average disposable income of household in the country
- ▶ Redistribution of income - current taxes on income, wealth, etc. paid by households divided by disposable income of households (net)
- ▶ Life expectancy at birth
- ▶ NEET rate - percentage share of young people (15-24) not in employment, education or training (in %)
- ▶ Percentage share of households with access to the internet at home (in %)
- ▶ Sum of Worldwide Governance Indicators (WGI).
- ▶ Additional factors:
 - ▶ GDP per capita (in thousands of €)
 - ▶ Unemployment rate (in %)

Model

$$Happiness_{i,r,t} = \alpha_0 + \sum \beta \text{ Individual } f_{i,r,t} + \sum \gamma \text{ Regional } f_{r,t} + \mu_{i,r,t}$$

Where: i is individual i , r is region r where individual i lives, t is time t , *Individual f* and *Regional f* are vectors of individual and regional factors mentioned above, β and γ are vectors of estimated coefficients.

Models with individual objective (and subjective) factors (1/2)

Objective ind. f		Subjective ind. f	
(Intercept)	6.772***	(Intercept)	8.009***
gender female	0.070***	gender female	0.201***
age 20-29	-0.301***	age 20-29	-0.126***
age 30-39	-0.650***	age 30-39	-0.393***
age 40-49	-0.855***	age 40-49	-0.530***
age 50-59	-0.940***	age 50-59	-0.485***
age 60-69	-0.662***	age 60-69	-0.318***
age 70-79	-0.577***	age 70-79	-0.169***
age 80	-0.349***	age 80	-0.005
student	0.460***	student	0.205***
unempl looking	-0.573***	unempl looking	-0.462***
unempl not looking	-0.524***	unempl not looking	-0.363***
sick, disabled	-0.620***	sick, disabled	0.104***
retired	-0.202***	retired	0.031
mil/com service	-0.201	mil/com service	-0.360*
housework	-0.037	housework	-0.004
other	0.081	other	0.159***
...	...	...	...
		health good	-0.382***
		health fair	-0.837***
		health bad	-1.535***
		health very bad	-2.347***
		safety safe	-0.250***
		safety unsafe	-0.462***
		safety very unsafe	-0.545***
		discrimination	-0.203***
		trust and satisf	0.234***

Models with individual Objective (and Subjective) Factors (2/2)

Objective ind. f		Subjective ind. f	
....	...	household 2	-0.020
household 2	-0.200***	household 3	-0.100***
household 3	-0.392***	household 4	-0.037
household 4	-0.314***	household 5	-0.014
household 5	-0.284***	minority	-0.275***
minority	-0.460***	pray no	-0.227***
pray no	-0.239***	partner no	-0.573***
partner no	-0.683***	edu years	0.015***
edu years	0.067***	edu years^2	0.000**
edu years^2	-0.001***	housh to cntry inc	0.502***
housh to cntry inc	1.021***	housh to cntry inc^2	-0.068***
housh to cntry inc^2	-0.127***	health good	-0.382***
		health fair	-0.837***
		health bad	-1.535***
		health very bad	-2.347***
		safety safe	-0.250***
		safety unsafe	-0.462***
		safety very unsafe	-0.545***
		discrimination	-0.203***
		trust and satisf	0.234***
Observations	117,744	Observations	105,128
R ²	0.138	R ²	0.271
Adjusted R ²	0.137	Adjusted R ²	0.271

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Model with Individual Objective and Regional Factors

	Est	Std. err		Est	Std. err
(Intercept)	2.172	(0.208)	housh to cntry inc	0.703	(0.021)
age 20-29	-0.329	(0.038)	housh to cntry inc^2	-0.098	(0.004)
age 30-39	-0.657	(0.041)	student	0.289	(0.031)
age 40-49	-0.886	(0.041)	unempl looking	-0.623	(0.027)
age 50-59	-0.921	(0.042)	unempl not looking	-0.579	(0.043)
age 60-69	-0.68	(0.045)	sick, disabled	-0.768	(0.035)
age 70-79	-0.612	(0.048)	retired	-0.163	(0.023)
age 80 +	-0.459	(0.052)	mil/com service	-0.224	(0.225)
gender female	0.097	(0.011)	housework	-0.078	(0.023)
partner no	-0.614	(0.017)	other	-0.013	(0.056)
pray no	-0.225	(0.015)	reg to country inc	-0.961	(0.051)
minority	-0.303	(0.024)	life expectancy	0.06	(0.003)
household 2	-0.024	(0.021)	NEET rate	-0.025	(0.001)
household 3	-0.065	(0.023)	redist of income	2.848	(0.194)
household 4	0.016	(0.025)	redist of income^2	-2.607	(0.267)
household 5+	0.027	(0.028)	internet	0.008	(0.001)
edu years	0.059	(0.005)	WGI	0.057	(0.002)
edu years^2	-0.001	(0.000)			

Multiple R-squared: 0.2051, Adjusted R-squared: 0.2049

F-statistic: 825 on 34 and 108684 DF, p-value: < 2.2e-16

Results: Individual Factors

- ▶ Females happier
- ▶ Middle-aged least happy
- ▶ Inverted U-shaped effect of education
- ▶ Students happier
- ▶ Being unemployed, ill or retired lowers happiness
- ▶ Household income: inverted U-shaped effect, maximum at 3.6 times national avg

Results: Regional/National Factors

- ▶ Controlling for individual income, living in a relatively rich region lowers happiness
- ▶ Those living in more developed regions (high life expectancy and internet connections, low need) are happier
- ▶ Income redistribution boosts happiness (insurance effect?)
- ▶ Good institutions raise happiness

Results: Males

	Est	Std. err		Est	Std. err
(Intercept)	1.554	(0.300)	housh to cntry inc	0.651	(0.029)
age 20-29	-0.356	(0.052)	housh to cntry inc^2	-0.086	(0.006)
age 30-39	-0.749	(0.058)	student	0.221	(0.044)
age 40-49	-0.985	(0.058)	unempl looking	-0.733	(0.037)
age 50-59	-1.033	(0.059)	unempl not looking	-0.660	(0.060)
age 60-69	-0.778	(0.063)	sick, disabled	-0.742	(0.049)
age 70-79	-0.694	(0.068)	retired	-0.169	(0.033)
age 80 +	-0.604	(0.076)	mil/com service	-0.247	(0.249)
partner no	-0.646	(0.027)	housework	-0.273	(0.064)
pray no	-0.284	(0.024)	other	-0.030	(0.083)
minority	-0.280	(0.034)	reg to cntry inc	-1.033	(0.074)
household 2	0.027	(0.032)	life expectancy	0.075	(0.004)
household 3	0.014	(0.034)	NEET rate	-0.019	(0.002)
household 4	0.076	(0.037)	redist of income	2.826	(0.274)
household 5+	0.126	(0.041)	redist of income^2	-2.478	(0.374)
edu years	0.028	(0.008)	internet	0.007	(0.001)
edu years^2	-0.001	(0.000)	WGI	0.048	(0.003)

Multiple R-squared: 0.2093, Adjusted R-squared: 0.2088

F-statistic: 409 on 33 and 50980 DF, p-value: < 2.2e-16

Results: Females

	Est	Std. err		Est	Std. err
(Intercept)	2.906	(0.289)	housh to cntry inc	0.765	(0.030)
age 20-29	-0.290	(0.055)	housh to cntry inc^2	-0.110	(0.006)
age 30-39	-0.559	(0.059)	student	0.362	(0.043)
age 40-49	-0.781	(0.059)	unempl looking	-0.503	(0.041)
age 50-59	-0.812	(0.060)	unempl not looking	-0.485	(0.062)
age 60-69	-0.586	(0.063)	sick, disabled	-0.796	(0.049)
age 70-79	-0.538	(0.067)	retired	-0.168	(0.031)
age 80 +	-0.340	(0.073)	mil/com service	-0.220	(0.491)
partner no	-0.583	(0.023)	housework	0.001	(0.026)
pray no	-0.197	(0.019)	other	0.017	(0.077)
minority	-0.334	(0.034)	reg to cntry inc	-0.906	(0.071)
household 2	-0.081	(0.028)	life expectancy	0.047	(0.004)
household 3	-0.157	(0.032)	NEET rate	-0.030	(0.002)
household 4	-0.065	(0.035)	redist of income	2.811	(0.274)
household 5+	-0.092	(0.040)	redist of income^2	-2.654	(0.380)
edu years	0.079	(0.007)	internet	0.008	(0.001)
edu years^2	-0.002	(0.000)	WGI	0.066	(0.003)

Multiple R-squared: 0.2046, Adjusted R-squared: 0.2041
 F-statistic: 449.5 on 33 and 57671 DF, p-value: < 2.2e-16

Results: Differences between Genders

- ▶ Household 5+ members: positive coefficient for males, negative for females.
- ▶ Education: maximum effect at 20 for females; at 14 for males.
- ▶ Housework: negative coefficient for males, insignificant for females.
- ▶ Unemployment: higher negative coefficients for males.
- ▶ Being single: stronger negative effect for females.

Models with Different Regional Factors

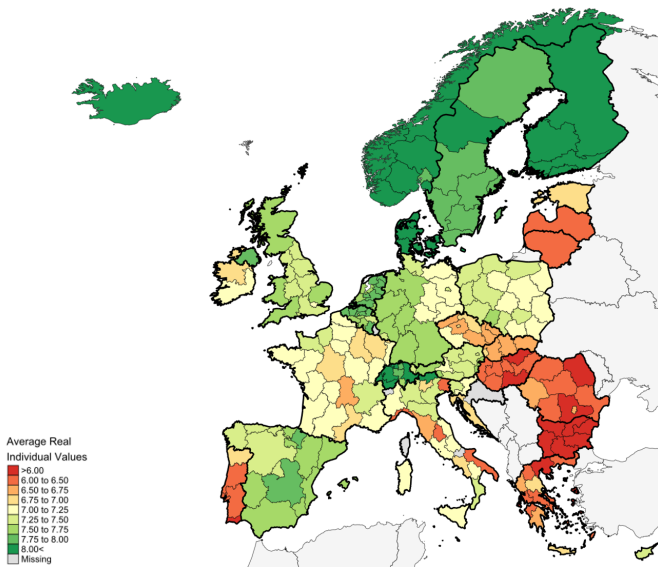
	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
individual factors	objective	objective	objective	obj + subj	objective	obj + subj
fixed effects	no	no	no	no	yes	yes
WGI	0.057*** (0.002)	0.067*** (0.002)	0.060*** (0.002)	0.048*** (0.002)	0.102*** (0.017)	0.058*** (0.017)
redist of income	2.848*** (0.194)		2.641*** (0.198)	1.102*** (0.225)	0.366 (0.470)	2.314*** (0.486)
redist of income ²	-2.607*** (0.267)		-2.151*** (0.270)	-1.032*** (0.291)	-1.060* (0.643)	-2.480*** (0.631)
reg to cntry inc	-0.961*** (0.051)	-0.980*** (0.053)	-0.707*** (0.051)	-0.413*** (0.058)	-0.415*** (0.076)	-0.684*** (0.094)
NEET rate	-0.025*** (0.001)	-0.026*** (0.001)		-0.013*** (0.001)	-0.019*** (0.002)	-0.022*** (0.003)
life expectancy	0.060*** (0.003)	0.066*** (0.003)	0.059*** (0.003)	0.072*** (0.003)	-0.021** (0.009)	-0.033*** (0.008)
internet access	0.008*** (0.001)	0.010*** (0.001)	0.011*** (0.001)	0.005*** (0.001)	0.007*** (0.001)	0.005*** (0.001)
GDP pc		0.004*** (0.001)		-0.011*** (0.001)	0.000 (0.001)	-0.001 (0.001)
unemployment			-0.001 (0.001)			
R ²	0.2051	0.2001	0.2023	0.2882	0.2170	0.3004
Adjusted R ²	0.2049	0.1998	0.2021	0.2878	0.2165	0.2999
Observations	108,719	110,279	108,918	91,149	108,719	91,149

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

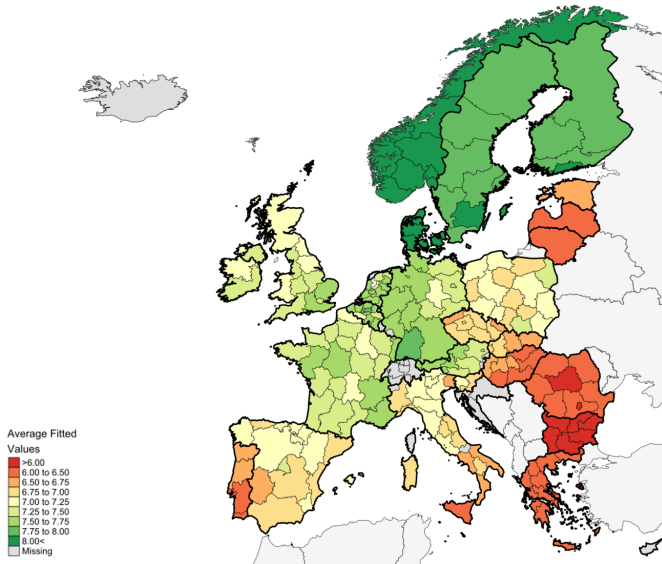
Predicted Happiness

- ▶ 'Predicted happiness' based on observable objective individual and regional characteristics.
- ▶ Bottom-up approach: this can be reported at the level of countries, regions, or for any socio-economic subcategory.
- ▶ Measured at place of residence rather than work: regional figures not skewed by commuters, intra-firm transfers, etc.
- ▶ Can be compared intra-nationally, and internationally without the need for PPP adjustments etc.
- ▶ Correlation with reported happiness: 0.85 at regional (NUTS2) level, 0.45 at individual level.
- ▶ Correlation of predicted happiness and GDP per capita: 0.78.
Correlation of reported happiness and GDP per capita: 0.65.

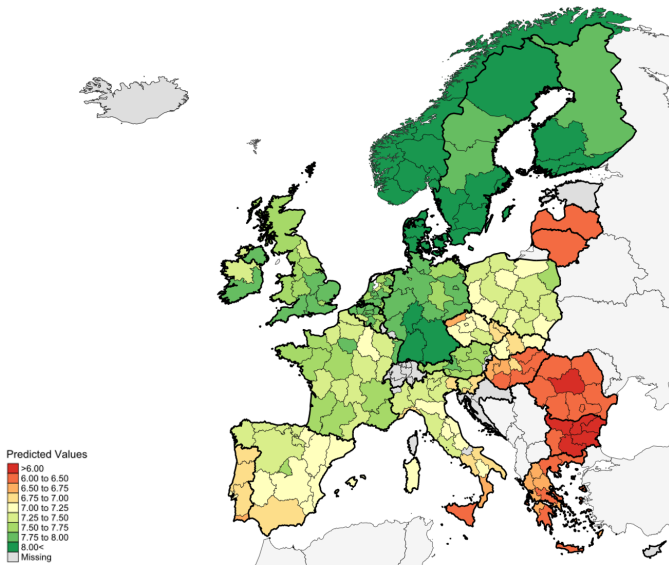
Average Reported Happiness



Average Predicted Happiness (sample averages)



Average Predicted Happiness (latest data)



Descriptive statistics

	GDP pc	Actual	Predicted	Residual
Mean	23,714	7.197	7.340	-0.175
St.dev.	12,539	0.682	0.633	0.360
C.o.v.	0.529	0.095	0.086	-2.055
Max	96,799	8.365	8.632	1.848
Min	2,608	4.795	5.187	-1.467
Best region	UKI1	DK03	DK04	ES63
Worst region	BG31	BG42	BG31	PT14

UKI1 - Inner London; DK03 - Southern Denmark;
DK04 - Midtjylland; ES63 - Ceuta; BG31- Severozapaden;
BG42 - Yuzhen tsentralen; PT14 - Alentejo

Slovak and Czech Regions

	SK01	SK02	SK03	SK04
GDP pc	24.282	9.291	7.781	6.750
happiness	6.899	6.661	6.568	6.584
predicted happiness	7.157	7.140	6.947	7.033
	CZ01	CZ02	CZ03	CZ04
GDP pc	25,265	10,561	10,656	8,951
happiness	6.820	6.736	7.016	6.513
predicted happiness	7.165	7.135	7.158	6.703
	CZ05	CZ06	CZ07	CZ08
GDP pc	9,891	11,344	9,707	10,034
happiness	6.767	6.671	6.711	6.669
predicted happiness	7.100	7.264	6.944	6.801

What If?

	SK01	SK02	SK03	SK04
Baseline	7.157	7.140	6.947	7.033
No unemployment	+0.015	+0.038	+0.051	+0.071
More school (16 yrs)	+0.029	+0.071	+0.068	+0.068
More marriage (75%)	+0.055	+0.105	+0.089	+0.083
No ill health	+0.006	+0.013	+0.012	+0.012
No religion	-0.036	-0.060	-0.059	-0.087

Conclusion

- ▶ Subjective indicators such as happiness provide a new perspective on measuring wellbeing.
- ▶ Broad measure rather than one based only on material output.
- ▶ Individual rather than firm-based measures.
- ▶ Predicted happiness indicator captures happiness and explains how it is attained.
- ▶ It can be used to compute happiness for different categories/groups and to estimate the impacts of changes in individual factors and regional indicators.

Conclusion (2)

- ▶ Much less variation within and across countries in actual and predicted happiness than in GDP per capita.
- ▶ GDP overestimates wellbeing in rich (and mainly urban) regions and underestimates it in poorer regions.
- ▶ This is, in part, because GDP pc is measured at the point of production, which is concentrated in cities.
- ▶ Happiness (reported or predicted) is measured at the place of residence.
- ▶ Compensating differentials: the same person would be happier if living a poor region than in a rich region.
- ▶ Policy makers should consider the impact of their decisions on happiness, not just on standard economic statistics.

Thank you for your attention.

Happiness, satisfaction with life, and economy (1/2)

	Happiness	Sat w life	Sat w econ
(Intercept)	2.172***	1.938***	10.659***
gender female	0.097***	0.064***	-0.154***
age 20-29	-0.329***	-0.470***	-0.248***
age 30-39	-0.657***	-0.854***	-0.415***
age 40-49	-0.886***	-1.073***	-0.435***
age 50-59	-0.921***	-1.118***	-0.495***
age 60-69	-0.680***	-0.747***	-0.277***
age 70-79	-0.612***	-0.594***	-0.048
age 80	-0.459***	-0.421***	0.129**
student	0.289***	0.311***	0.371***
unempl looking	-0.623***	-0.971***	-0.616***
unempl not looking	-0.579***	-0.781***	-0.447***
sick, disabled	-0.768***	-0.987***	-0.543***
retired	-0.163***	-0.136***	-0.144***
mil/com service	-0.224	0.094	-0.089
housework	-0.078***	-0.081***	-0.142***
other	-0.013	-0.070	-0.205***
minority	-0.303***	-0.414***	0.146***

Happiness, satisfaction with life, and economy (2/2)

	Happiness	Sat w life	Sat w econ
household 2	-0.024	-0.184***	-0.205***
household 3	-0.065***	-0.246***	-0.286***
household 4	0.016	-0.197***	-0.250***
household 5	0.027	-0.239***	-0.243***
pray no	-0.225***	-0.255***	0.006
partner no	-0.614***	-0.498***	-0.198***
edu years	0.059***	0.070***	0.026***
edu years^2	-0.001***	-0.002***	-0.001**
housh to cntry inc	0.703***	0.974***	0.602***
housh to cntry inc^2	-0.098***	-0.131***	-0.071***
WGI	0.057***	0.083***	0.094***
redist of income	2.848***	2.853***	5.114***
redist of income^2	-2.607***	-2.047***	-6.266***
reg to cntry inc	-0.961***	-1.164***	-2.712***
NEET rate	-0.025***	-0.038***	-0.122***
life expectancy	0.060***	0.071***	-0.068***
internet	0.008***	0.009***	0.033***
R ²	0.205	0.237	0.273
Adjusted R ²	0.205	0.236	0.272

Fixed effects

	FE Model 10		FE Model 11	
	Estimate	Std. err	Estimate	Std. err
BE	0.481***	(0.051)	0.339***	(0.049)
BG	-0.649***	(0.155)	-0.299**	(0.150)
CZ	-0.251***	(0.088)	-0.053	(0.085)
DE	-0.014	(0.040)	0.225***	(0.039)
DK	0.588***	(0.157)	0.040	(0.148)
EE	-0.153*	(0.080)	0.006	(0.078)
ES	0.922***	(0.093)	1.183***	(0.090)
FI	0.335***	(0.053)	0.133***	(0.051)
FR	0.068	(0.058)	0.305***	(0.056)
GB	0.273***	(0.041)	0.319***	(0.040)
GR	-0.025	(0.129)	0.140	(0.125)
HU	-0.558***	(0.106)	-0.356***	(0.103)
IE	-0.075*	(0.045)	-0.037	(0.044)
IT	0.816***	(0.146)	0.937***	(0.140)
LT	-0.359***	(0.108)	-0.088	(0.105)
LV	-0.315***	(0.113)	0.139	(0.110)
NL	0.681***	(0.100)	0.459***	(0.097)
NO	0.191***	(0.055)	-0.078	(0.052)
PL	-0.304***	(0.067)	0.152**	(0.065)
PT	0.189**	(0.096)	0.423***	(0.093)
RO	-0.598***	(0.101)	-0.306***	(0.100)
SE	0.619***	(0.086)	0.161*	(0.083)
SI	0.450***	(0.156)	0.741***	(0.152)
SK	-0.570***	(0.084)	-0.126	(0.081)

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

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