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Abstract
This paper analyses whether hosting the most prestigious European cultural event, the European Capital of Culture, has an impact on regional economic development and the life satisfaction of the local population. We show that European Capitals are hosted in regions with above-average GDP per capita, but do not causally affect the economic development in a significant way. Surprisingly, using difference-in-difference estimations, a *negative* effect on the wellbeing of the regional population is found during the event. Since no effect is found before the event, reverse causality and positive anticipation can be ruled out. The negative effect during the event might result from dissatisfaction with the high levels of public expenditure, transport disruptions, general overcrowding or an increase in housing prices.

Keywords
culture, European Capital of Culture, life satisfaction, mega-events

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Introduction

Founded in 1985, the European Capitals of Culture (ECOC) are now regarded as the most prestigious and popular European cultural event (Mittag, 2008). No comparable series of European cultural programmes or events exist that have generated such a large expenditure (Palmer, 2004). All ECOC projects required large investments by public authorities. For mega-events, such major public subsidies are usually justified with economic multiplier effects or externalities. However, the abundant literature on hosting major sport events has, at best, shown negligible economic benefits for mega-events (Kavetsos and Szymanski, 2010). Our

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estimations show a negative and significant effect of hosting an ECOC on the life satisfaction of the regional population. The coefficient varies around −0.08, which is a sizeable effect on a life satisfaction scale from 1 to 4.

Whether mega-events, especially sporting events, produce net economic benefits has been discussed extensively in the literature (for a review on sporting events see Matheson, 2006). Mega-events create *jobs* and increase *wages* in the construction sector – and, by spillover effects, also in other sectors, they attract additional flows of tourists, require major infrastructural investments and influence the housing market and land values (see Ingerson, 2001; Lertwachara and Cochran, 2007; Siegfried and Zimbalist, 2002; Roche, 1992)

Overall, the literature does not support the view that hosting a mega-event will produce a net increase in economic activity. It may lead to problems especially for people with low incomes, exacerbating social problems and tending to deepen existing divides among residents (Hall and Hodges, 1998; Malfas et al., 2004). The positive effects are usually compensated by substitution, crowding out and leakages. However, what really matters for an economic evaluation is the total effect on *social welfare*. Life satisfaction or subjective wellbeing has been found to be a valid proxy for utility as used in economic theory (Frey, 2008). Hosting an ECOC may impact life satisfaction in various ways. In some cities this event has led to substantial improvements of public spaces and public transportation systems, as well as urban renewal. A positive impact on life satisfaction may also result from the creation of additional jobs and the availability of new customers for businesses. On the negative side, building sites may generate unpleasant noise and make travelling to work more difficult. Also, the influx of tourists might cause some people to be less satisfied with life because of congestion in public transport, additional disruptions, littering or increased crime. Housing prices may also rise. The Life Satisfaction Approach allows individuals to integrate and value the relative importance of such effects.

The European Capitals of Culture

Literature

The European Capital of Culture (ECOC) is one of the most attractive events in the European Union; in fact, according to some European bodies, this prestigious event has advanced to being *the* most popular and admired event within the European Union (Mittag, 2008). Today, the ECOC is Europe's most ambitious collaborative cultural project both in scope and scale, with budgets far exceeding those of any other cultural event (European Communities, 2009). The European Capitals of Culture have so far rarely been analysed in the economic literature. A few papers exist that focus on the economic impact of the event in a specific town or region, but only a limited number of studies more critically evaluate a whole range of ECOC (Mittag, 2008).

The European Capitals of Culture analysed by the study 'European cities and Capitals of Culture' (Palmer, 2004) comprised a broad scale and scope of *cultural events*. The most prominent sectors were theatre, visual arts, music, street parades and other open-air events, heritage and history, as well as architecture. Traditional, classical, contemporary and modern forms of art were displayed. On average, approximately 500 ECOC projects took place in one year. The cities tried to reach a wide audience and to increase participation in culture by conducting projects in public spaces, and holding many festivities, parades and open-air events (see, e.g., the case study for Rotterdam, Cultural City of Europe 2001 by Richards and Wilson (2004) or for Salamanca,

European Capital of Culture 2002 by Herrero et al. (2006)). To draw larger audiences, a large number of free events were offered.

In all of the cities analysed, there was investment in *infrastructure*. In some cities major urban regeneration projects were undertaken by improving roads, developing derelict areas and remodelling public squares and buildings. The most common infrastructure projects were improvements to public space, lighting and cultural infrastructure, including refurbishments and restorations of existing facilities and monuments, as well as the construction of new cultural buildings such as concert halls and museums. Many ECOC reported difficulties with their infrastructure projects because they had to be realised within only a few years (Palmer, 2004).

With respect to the general *financial situation*, all ECOC projects required large investments by public authorities, with funding coming primarily not from the municipality, but rather from the state or regional authorities.[1] Public-sector contributions from national, city, regional and European Union sources represented, on average, 77.5% of total investments. The contribution of the European Union, on average, accounted for 1.8% and private sponsorship averaged at 13%. Cultural programme budgets ranged from €5.48 million in Reykjavik to €58.6 million in Lille. The overall average is €25.6 million. Capital expenditure, including new provision and upgrading of cultural capital (e.g. museums, theatres, concert halls), urban revitalisation (e.g. renovation of squares, streets, gardens) and investment in infrastructure (e.g. rail stations, underground, roads), varied from less than €10 million in Bologna and Avignon to over €220 million in Copenhagen, Thessaloniki, Weimar and Genoa. Several experts placed the total expenditure attributed to the 21 cities analysed between €3.5 billion and €3.75 billion.

Measuring the *economic impact* of cultural events is confronted with many difficulties, including the problem of developing appropriate indicators, reflecting the multiple objectives of far-reaching events such as the ECOC (see e.g. Saayman and Saayman, 2004). Cities saw their main economic priorities as fostering tourism, image management, urban revitalisation, and strengthening industry and job creation. The most significant impact to the city economy was seen in tourism and visitor attraction. In the period 1995–2003, overnight stays rose, on average, by 12% in the ECOC year and declined by almost 4% in the following year (compared with the level before the ECOC took place, see Palmer, 2004).

The impact on GDP per capita and growth

Previous studies have focused on the impact of European Capitals of Culture on specific economic aspects, such as infrastructure investment, financial budgets or tourism flows (Mittag, 2008; Palmer, 2004). A problematic aspect of economic-impact studies is that they disregard substitution effects. Substitution effects might occur in time and place, when people visiting an ECOC do not visit the hosting region in later years or do not visit other cities in the hosting region or country. Furthermore, economic-impact studies often assume multiplier effects or indirect profitability. When focusing only on specific indicators, such as tourism, substitution effects to other sectors might be disregarded. Thus, to investigate the net economic impact of hosting an ECOC, we estimate the impact on GDP per capita and GDP per capita growth.

Table 1 shows univariate and multivariate regression results of the relation of hosting an ECOC on GDP per capita. GDP per capita and GDP per capita growth, the dependent variables in this section, are provided by BAK Basel. We use standard

Table 1. The effect of hosting a European Capital of Culture on GDP per capita.

	Estimation 1	Estimation 2	Estimation 3	Estimation 4
ECOC $t-4$			7730**	−482.2
			(2.482)	(−0.969)
ECOC $t-3$			6777**	−801.2
			(2.347)	(−1.183)
ECOC $t-2$			7076**	80.41
			(2.279)	(0.246)
ECOC $t-1$			6497**	−461.4
			(2.356)	(−1.256)
ECOC t	5214**	3165	7022**	−265.6
	(2.367)	(0.0206)	(2.475)	(−0.820)
ECOC $t+1$			6260**	−301.9
			(2.177)	(−0.896)
ECOC $t+2$			7817**	−106.7
			(2.373)	(−0.566)
Macro-economic controls	No	Yes	No	Yes
Year fixed effects	No	Yes	No	Yes
Region fixed effects	No	Yes	No	Yes
Constant	18,773***	11,723***	18,978***	11,753***
	(31.58)	(6.154)	(33.34)	(6.115)
Number of observations	2342	386	1751	386
R^2	0.004	0.997	0.046	0.997

Notes: Dependent variable: regional GDP per capita (on Nuts 2 level) ***: significant at the 99% level; **: significant at the 95% level. Robust clustered standards errors. *t*-statistic in parentheses.

macro-economic control variables (Abadie and Gardeazabal, 2003; Barro, 1991), namely population density, sectoral shares and human capital, represented by education. The control variables are drawn from Eurostat between 1990 and 2009, and comprise 28 ECOC. Six cities from that time period cannot be included because of missing data. All data are analysed with variables on subnational geographical units, which are defined as a NUTS 2 (Nomenclature des unités territoriales statistiques) regional level. Hosting an ECOC is the key explanatory variable. A dummy variable is constructed taking the value 1 if there is an ECOC in the respective region in a certain year, and 0 otherwise. In addition, lags and leads of this variable have been created.

The univariate regression (Estimation 1) shows that hosting an ECOC is significantly and positively correlated with GDP per capita. Average GDP per capita is significantly higher in the regions hosting an ECOC, compared with the other European non-hosting regions. In host regions, the average GDP per capita in the respective year adds up to €24,000. All other European regions have an average GDP per capita of €18,800. Since ECOC are located in cities, this descriptive difference in average GDP per capita is likely to reflect the difference in economic development between urban and rural areas, and not a causal impact of the event.

The multivariate regression (Estimation 2) also includes standard macro-economic control variables, region and year fixed effects. When including fixed effects and other controls, the correlation between hosting an ECOC and GDP per capita becomes statistically insignificant, confirming the presumption that the higher GDP per capita merely

Table 2. The effect of hosting a European Capital of Culture on GDP per capita growth.

	Estimation 5	Estimation 6	Estimation 7	Estimation 8
ECOC $t-4$			0.0158**	0.00640
			(2.309)	(0.849)
ECOC $t-3$			0.00105	−0.0324
			(0.106)	(−1.208)
ECOC $t-2$			−0.000103	−0.000591
			(−0.0143)	(−0.0782)
ECOC $t-1$			−0.000631	−0.000737
			(−0.0972)	(−0.0745)
ECOC t	0.00358	−0.00297	0.00763	−0.00840
	(0.805)	(−0.688)	(1.883)	(−0.870)
ECOC $t+1$			0.00852	−0.00742
			(1.580)	(−0.674)
ECOC $t+2$			0.0175	−0.00927
			(1.825)	(−0.731)
Macro-economic controls	No	Yes	No	Yes
Year fixed effects	No	Yes	No	Yes
Region fixed effects	No	Yes	No	Yes
Constant	0.0155***	0.0378	0.0168***	0.0589
	(24.55)	(0.703)	(23.72)	(1.040)
Number of observations	2188	386	1751	386
R^2	0.000	0.492	0.004	0.524

Notes: Dependent variable: regional GDP per capita growth (on Nuts 2 level) ***: significant at the 99% level; **: significant at the 95% level. Robust clustered standards errors. *t*-statistic in parentheses.

reflects structural differences between urban host regions and rural non-host regions.

This selection effect is confirmed by Estimations 3 and 4. Here we include lags and leads of hosting an ECOC. We consider the 4 years prior to, and the 2 years after, the event in order to test for selection effects (years 4 and 3 before the event), anticipation effects (years 2 and 1 before the event) and legacy effects (1 and 2 years after the event). Anticipation effects would occur if, prior to the event, the economic activity was stimulated significantly compared with other regions, for example by increased construction. Legacy effects would show up if the event increased the economic development subsequent to the event, for example, owing to higher tourism flows. Estimation 3 does not include any control variables or fixed effects and shows that average GDP per capita in a host region is higher than in other regions during the whole time period considered. When employing macro-economic controls, year and region fixed effects, all coefficients of the lag and lead variables become insignificant (Estimation 4). This indicates that there are no anticipation or legacy effects. The ECOC have merely been hosted in more developed regions of the respective countries.

In Table 2 we investigate whether hosting an ECOC fosters economic *growth* or, more generally, if host regions are more economically dynamic regions. The univariate regression (Estimation 5) shows that hosting an ECOC is positively, but insignificantly, correlated with GDP per capita. GDP per capita growth in host regions is, on average, 1.9% compared with an average growth rate of 1.6% in all European non-host regions.

Estimations 5 and 6 in Table 2 indicate that the difference in average economic growth is not statistically significant, no matter whether control variables and fixed

effects are used or not. In Estimations 7 and 8 (Table 2) we also include lag and lead variables to check for possible increased economic activity before and after the event. When including fixed effect and macroeconomic control variables, hosting an ECOC is not significantly correlated with GDP per capita growth 4 years before and 2 years after the event.

While it might be the case that hosting an ECOC has an impact on single economic indicators such as tourism or construction, it does not have a significant *net* impact on a region's economic development reflected by GDP per capita growth. The failure of a net effect might be due to substitution effects. For example, increased construction activity may substitute for other government expenditures or may crowd out private expenditure. According to Palmer (2004) the host regions also experience only a short-term economic increase in overnight stays by 12% in the event year, which is followed by a 4% drop in the following year.

Our results are in line with studies on the impact of mega-sporting events, which show that 'the economic contribution of such events might lie in a single impulse of increased demand during the period of the event, and consequently might lose its effect in a short period of time' (Malfas et al., 2004: 213).

The life satisfaction approach

Major state interventions in the cultural sector are usually justified with the insufficient supply provided by the private sector owing to culture having positive externalities. Moreover, it is argued that other benefits exist since culture has stimulating effects on the economy and encourages tourism (Frey, 2003). In addition to the benefits for people actually visiting cultural events, culture also produces positive external effects, namely 'non-user benefits' that accrue to people not consuming the cultural supply (Frey and Pommerehne, 1990). The most popular way to measure the value of cultural venues or events is to consider the monetary revenue created. However, this method disregards effects not reflected in the market. In contrast we focus on the new possibilities provided by modern happiness research.

Happiness research has grown to be an important and lively area of economics. Subjective wellbeing (SWB), that focuses an individual's cognitive or affective assessment of his or her own life, is used as a proxy for utility. In line with much of the literature on SWB, this paper uses the Life Satisfaction Approach based on national and international surveys (see e.g. Bruni and Porta, 2007; Frey, 2008). Respondents are asked to provide an assessment of their overall satisfaction with life.

The Life Satisfaction Approach has several advantages over the standard methods to measure non-market goods. It does not rely on respondents' ability to consider all relevant consequences of a change in the provision of cultural goods. Rather, individuals are asked to evaluate their general life satisfaction. Furthermore, happiness research explicitly captures utility changes in the absence of market equilibria. In addition, the indirect effects of externalities on individuals' utility are captured even if no direct effects exist (Frey and Stutzer, 2002).

SWB indicators are prone to several systematic and non-systematic biases. However, the relevance of these influences depends on the usage of the SWB measurements. For the purpose of identifying the determinants of life satisfaction, it is neither necessary to assume that reported SWB is cardinally measurable, nor that it be interpersonally comparable. Reported SWB is moderately stable and sensitive to changing life circumstances. In addition, different measures of happiness correlate well with observable behaviour. People reporting high levels of SWB, for

example, smile more often during social interactions and are less likely to commit suicide (Frey, 2008).

There has been little research conducted concerning the relationship between culture and life satisfaction. Frey and Meier (2006) find a positive relationship between life satisfaction and cultural visits, but the direction of causality remains open. Does a higher frequency of visits to cultural events increase contentment, or do happier people tend to attend such activities more frequently? To reduce causality issues, we focus on the hosting of an ECOC as a quasi-exogenous shock.[2]

European Capital of Culture and life satisfaction

Using the ECOC event allows us to analyse the exogenous increase in the supply of culture in combination with the measurement of regional life satisfaction. There are major positive and negative side effects of mega-events that may affect life satisfaction. In some cities there has been urban renewal as well as substantial improvements to public spaces and public transportation systems. A positive impact on life satisfaction could also result from the creation of additional jobs and greater economic turnover. On the negative side, construction works may generate unpleasant noise and make travelling to work more difficult. The influx of tourists may cause people to be less satisfied with life because of congestion in public transport or additional disruptions or littering. The Life Satisfaction survey includes people who do not attend cultural events but are nonetheless indirectly affected by an ECOC taking place in their region.

Data

Self-reported life satisfaction, the dependent variable, and individual-specific determinants including household income, size of household, employment situation, age, gender, marital status and number of children, are drawn from 'The Mannheim Eurobarometer Trend File 1970–2002'. The longitudinal data contain repeated cross-sectional surveys. As it is not a true panel data set we cannot include fixed effects on individual level. This compilation offers unified data from 86 Eurobarometer surveys conducted in 18 European nations in the time period 1970 to 2002.[3] Two of these nations did not host an ECOC during this time period and for one region, no data exist in the relevant time period.[4] The final data set used includes 14 nations and 24 ECOC.[5] All data are analysed by comparing individual variables across subnational geographical units, which are defined as a NUTS 2 regional level. For all individuals the data set contains information about the place of residence on NUTS 2 level.

Data concerning reported life satisfaction are based on the question: 'Would you say you are: very satisfied, fairly satisfied, not very satisfied, or not at all satisfied with your life in general?'. Minor deviations in the wording exist in different surveys. Respondents could answer according to a four-point scale ranging from 'not at all satisfied' through 'not very satisfied' and 'fairly satisfied' to 'very satisfied'.

Hosting an ECOC is the key explanatory variable. A dummy variable is constructed taking the value 1 if there is an ECOC in the respective region in a certain year, and 0 otherwise. In addition, lags and leads of this variable have been created and will be called announcement effect, selection and legacy variables. The NUTS 2 regions which hosted an ECOC in the time period 1985 to 2002 and have been analysed in this paper, are highlighted in Figure 1. The ECOC have been distributed over many different regions of Europe.

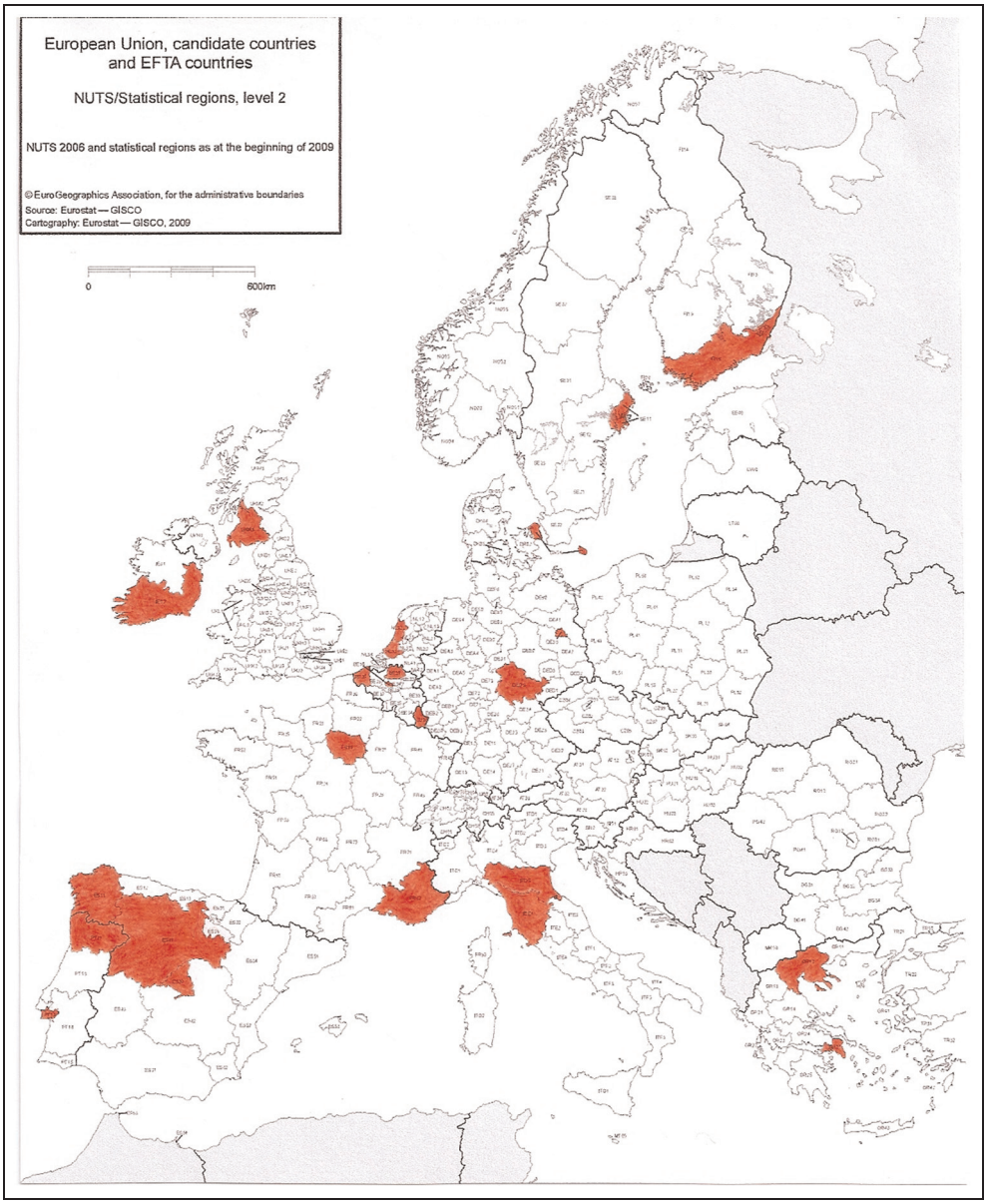

Figure 1. NUTS 2 regions analysed hosting a ECOC 1985–2002.
Source: http://epp.eurostat.ec.europa.eu/cache/GISCO/yearbook2009/RYB-Full-NUTS2-2009-EN.pdf.

In the Trend File, household income, which serves as an important control variable, is classified into between 6 and 12 income groups. The size of these groups varies considerably between countries and surveys. Therefore, the original income-group information is translated into a number, which represents the mean of the

respective group interval (for example, the lowest income group '€0 to €1000' is coded as €500). These mean values are converted into USD, taking into account purchasing-power parity. Since the common European Currency was only introduced in 1999, we use USD instead of EUR to enable comparisons of income from different countries. The square root of household size is included in the regressions in order to control for the effect of household size on equivalent income. Because the highest income group is open-ended, respondents that fall into this income group are excluded. Income is included in a logarithmical functional form, which accounts for decreasing marginal utility of income.

Individual characteristics including employment situation, gender and marital status, have been added in the form of dummy variables. The age of respondents is included in its normal and quadratic forms, as studies have convincingly shown that there is a non-linear U-shaped relationship between life satisfaction and age (Dolan and Peasgood, 2006). To control for the general economic situation in a region, data on regional GDP per capita are included in the regressions, based on data from BAK Basel.[6]

Empirical strategy

The effect of the ECOC on individual life satisfaction is first captured by a raw comparison of mean values. The crucial event that occurs is a region's hosting of an ECOC in a certain year. Figure 2 depicts the average life satisfaction of the regions hosting an ECOC in comparison with all other regions in all other time periods. Figure 2 reveals that the individuals living in the host regions have a significantly lower average life satisfaction. In a host region, average life satisfaction in the year of the event is 2.94 (out of 4); in the other regions it is 3.05.

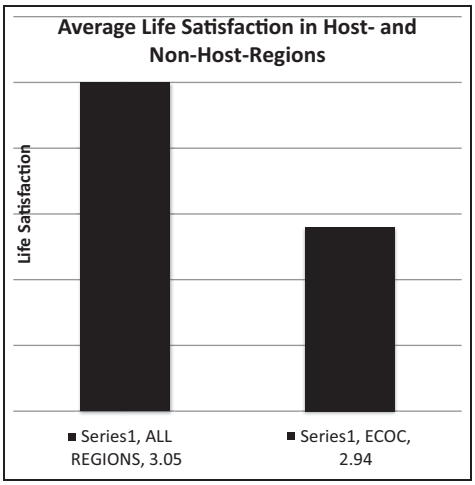

Figure 2. Average life satisfaction in regions hosting a European Capital of Culture.

However, raw life satisfaction differences may also reflect various characteristics that distinguish ECOC regions from other regions. The multivariate regression presented in Table 3 controls for a multitude of such characteristics. The empirical analysis follows the specifications of a subjective wellbeing function (see e.g. Frey and Stutzer, 2002; Frey et al., 2007). To measure the impact of hosting an ECOC, we perform the following difference-in-difference estimation on individual level:

$$LS_{i,j,t} = \beta_0 + \beta_1 ECOC_{j,t} + \gamma z_{i,j,t} + \beta_2 m_{j,t} + \omega_j + \tau_t + \varepsilon_{i,j,t} \quad (1)$$

Where $LS_{i,j,t}$ is reported life satisfaction as a measure of subjective wellbeing of individual i in region j at time t. The treatment effect, in this paper the occurrence of the ECOC, in region j at time t is represented by the term $ECOC_{j,t}$. In the simplest set-up of a difference-in-difference model, outcomes are observed for two groups for two time periods. The treatment group is exposed to a specific event in the second period but not in the first period. The control group is not

Table 3. The effect of hosting a European Capital of Culture on life satisfaction (diff-in-diff).

	Estimation 9 univariate	Estimation 10 micro controls	Estimation 11 micro & macro controls
ECOC	−0.108	−0.137***	−0.0869**
	(−1.798)	(−3.134)	(−2.335)
Ln (income)		0.295***	0.185***
		(12.42)	(18.32)
Size of household$^{1/2}$		−0.140***	−0.0512***
		(−5.332)	(−5.479)
Education		0.0124***	0.00948***
		(5.526)	(6.756)
Employed		Reference	
Unemployed		−0.286***	−0.297***
		(−9.876)	(−15.82)
Retired		−0.0126	0.0207**
		(−0.765)	(2.113)
Gender (Man=1)		−0.0388***	−0.0368***
		(−5.861)	(−6.811)
Age		−0.0227***	−0.0200***
		(−19.04)	(−19.63)
Age^2		0.000256***	0.000211***
		(20.64)	(21.22)
Single		Reference	
Married		0.0630***	0.0914***
		(4.049)	(12.27)
Living together		0.0248	0.00309
		(1.342)	(0.307)
Divorced		−0.140***	−0.137***
		(−7.462)	(−10.89)
Separated		−0.193***	−0.198***
		(−8.772)	(−8.345)
Widowed		−0.0800***	−0.0610***
		(−6.177)	(−5.856)
No children		Reference	
One child		0.00359	−0.0182***
		(0.380)	(−3.158)
Two children		0.0567***	−0.00795
		(4.311)	(−1.039)
Three children		0.107***	−0.0112
		(5.390)	(−0.839)
Four children		0.133***	−0.0352
		(3.958)	(−1.583)
GDP per capita growth			0.000506
			(0.309)
Year fixed effects	No	No	Yes
Region fixed effects	No	No	Yes
Constant	3.050***	1.512***	2.184***
	(73.99)	(11.48)	(30.41)
Number of observations	507,325	148,719	146,770
R^2	0.000	0.121	0.189

Notes: Dependent variable: Life satisfaction; ***: significant at the 99% level; **: significant at the 95% level. Robust clustered standards errors. *t*-statistic in parentheses.

exposed to the treatment during either period. Citizens of an ECOC region represent the treatment group and individuals from other European regions represent the control group. The average change of the relevant outcome in the control group is subtracted from the average change of that outcome in the treatment group. This removes biases in second-period comparisons between the treatment and control groups that could be the result of permanent unobserved differences between the two groups, as well as biases from comparisons over time in the treatment group that could be the result of trends. When estimating a multiple group and time period setting, the coefficient β_1 reflects the difference-in-difference estimator. Vector z captures individual-level determinants of life satisfaction such as age or gender, log-income or education. The term $m_{j,t}$ captures GDP per capita growth on the regional level as a macro-economic control. Region fixed effects, ω_j, take into account unobserved time-invariant location factors. In addition, a set of time fixed effects capturing unobserved location-invariant factors over time, such as major macro-economic shocks, are included by the term τ_t. $\varepsilon_{i,j,t}$ is the error term. Because the treatment variable only varies at the regional level, standard errors are clustered. The regressions are estimated with an OLS model. Strictly, life satisfaction is an ordinally scaled variable, which would speak for an ordered response model. In Table A4 (see Appendix) we re-estimated the life satisfaction models of Table 3 with ordered logit models. As can be seen, the resulting coefficients are quantitatively and qualitatively the same. For life satisfaction estimations OLS and ordered logit models usually deliver very similar results with respect to sign, relative size and significance (this has also been shown by Ferrer-i-Carbonell and Frijters, 2004). Thus, in the main text we focus on the OLS results as they are easier to interpret and deliver more meaningful interaction results.

Difference-in-difference estimations

Table 3 shows the results of the difference-in-difference-estimations of the impact of an ECOC on individual life satisfaction. A negative and statistically significant impact is found in all three specifications (ECOC-coefficient), suggesting that hosting an ECOC lowers the subjective wellbeing of the persons living in the corresponding region.

Estimation 9 shows the raw difference between regions hosting an ECOC and all other regions. The coefficient is significant at the 90% level. Estimation 10 includes standard socio-economic and socio-demographic control variables at the individual level. The coefficients of the control variables all show the expected signs. Estimation 11 includes GDP per capita growth as a macro-economic control, year fixed effects in order to control for large yearly fluctuations, and region fixed effects in order to control for time-invariant factors, such as institutional differences or geographical preconditions. Compared with the raw difference, the estimated ECOC-coefficient decreases by one-fifth of its size. When a region hosts an ECOC, the life satisfaction of the local population decreases roughly by 0.09 on the four-point scale. The size of the effect equals one-fourth of the effect of being unemployed (compared with having employment) and thus is quite sizeable.

Possible explanations for this decrease are factors similar to those found in connection with other mega-events.[7] The increased number of tourists causes noise, disturbance, overcrowding of public places and overcrowding of means of transportation, thus pushing up prices. Furthermore, a reallocation of public funds towards activities connected with the event takes place, which does not necessarily reflect the preferences

of the local population. A further explanation is suggested by Hall and Hodges (1998) whose analysis emphasises the effects of mega-sporting events on the housing market and land values. The authors claim that the building of event-related infrastructure can involve housing relocation because of the compulsory purchase of land for clearance and building. It may also lead to a rise in rents and house prices, negatively affecting people with low incomes living in these areas. Negative social impacts have also been identified in connection with the 1996 Atlanta Olympic Games. Between 1990 and 1995, 9500 units of affordable housing were lost and $350 million of public funds were diverted from low-income housing, social services and other support services for homeless and poor people, to Olympic preparation (Beaty, 1998). Moreover, at the time in which Olympic-related infrastructure was at its peak, house prices rose 7% above inflation, compared with the usual 2% (Horin, 1999).

The effect on various socio-economic groups

The difference-in-difference-estimations show a negative average effect on life satisfaction of the population in a region hosting an ECOC. To investigate which subgroups of the population are affected more or less strongly by hosting this event, we employ interaction effects. Based on Estimation 3 (Table 4), we estimate the interactions of hosting an ECOC with socio-economic individual determinants.

In Estimation 12, the variable ECOC is interacted with household income. The resulting coefficient is positive, but not significant. Thus, the (negative) impact of hosting an ECOC on the local population's life satisfaction does not depend on income.

The interaction of education and the variable ECOC is significant and positive (Estimation 13). The highest level of education received is measured with the age at which an individual graduated. The higher this age, the more education someone enjoyed. The positive and significant interaction effect suggests that more highly educated individuals suffer less from hosting an ECOC. Approximately ten years of additional education offsets the negative effect of this event; this equates, for example, with the difference between leaving high school at the age of 15, and university at the age of 26. This result is plausible considering that more highly educated individuals tend to attend cultural events more often. Individuals with higher education thus profit from the extended cultural supply more than individuals with lower education. This partly offsets the negative effects of hosting the event for better-educated people.

The interaction with being unemployed is negative and significant (Estimation 14). Being unemployed roughly doubles the negative effect of hosting an ECOC, from -0.08 to -0.17.[8] Since unemployment is correlated with education and (therewith) cultural attendance, the same logic as for the lower-educated applies: Unemployed individuals bear more of the cost of hosting this event (noise, disturbance, construction, congestion and especially higher prices), while not profiting from attending cultural events in the same way that employed or the better-educated do. The interaction with being retired is positive but insignificant and will not further be discussed here (Estimation 15).

The estimated interaction so far has dealt with differences at the individual level. It is also possible that the effect of hosting an ECOC varies between regions. To investigate possible differences on a macro-economic level, we estimate interaction effects of ECOC and GDP per capita growth (Estimation 16). The resulting coefficient is positive and significant. Faster-growing regions suffer less from hosting the event. An additional economic growth of

Table 4. Interactions of European Capitals of Culture and socio-economic subgroups.

	Estimation 12 income	Estimation 13 education	Estimation 14 unemployment	Estimation 15 retirement	Estimation 16 GDPPC growth
ECOC	−0.272	−0.134***	−0.0792***	−0.0950**	−0.213***
	(−1.570)	(−3.098)	(−5.107)	(−2.324)	(−5.345)
Ln (income)	0.184***	0.185***	0.185***	0.185***	0.185***
	(18.00)	(18.33)	(48.53)	(18.32)	(18.36)
ECOC * Ln (income)	0.0260				
	(1.086)				
Education	0.00948***	0.00932***	0.00948***	0.00948***	0.00949***
	(6.754)	(6.687)	(12.60)	(6.751)	(6.797)
ECOC * Education		0.0108**			
		(2.296)			
Unemployed	−0.297***	−0.297***	−0.295***	−0.297***	−0.297***
	(−15.86)	(−15.82)	(−39.40)	(−15.84)	(−15.84)
ECOC * Unemployed			−0.0905		
			(−1.715)		
Retired	0.0207**	0.0208**	0.0206***	0.0202**	0.0209**
	(2.111)	(2.121)	(3.396)	(2.042)	(2.134)
ECOC * Retired				0.0355	
				(0.883)	
GDP per capita growth	0.000510	0.000493	0.000497	0.000504	0.000148
	(0.311)	(0.301)	(0.689)	(0.308)	(0.0905)
ECOC * GDP per capita growth					0.0449***
					(2.900)
Individual controls	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes
Constant	2.186***	2.184***	2.184***	2.184***	2.177***
	(30.08)	(30.44)	(65.84)	(30.41)	(30.64)
Number of observations	146,770	146,770	146,770	146,770	146,770
R^2	0.189	0.189	0.189	0.189	0.190

Notes: Dependent variable: Life satisfaction; ***: significant at the 99% level; **: significant at the 95% level. Robust clustered standards errors. *t*-statistic in parentheses.

roughly 4% offsets the effect of hosting an ECOC. This amount is not only statistically significant, it is also economically quite large.

Announcement, selection and legacy effects

The previous estimations might suffer from an endogeneity bias if cities with a lower average happiness are nominated by the European selection committee. To rule out reverse causality, we identify the average happiness 4 years before hosting the event. This approach allows us to also check for announcement effects, which might arise after a city has been nominated. Announcement effects potentially lead to an increase in happiness, by anticipation or economic stimulus. Happiness decreases if disturbance by construction works or re-allocation of public funds dominates. In our

Table 5. Selection, announcement and legacy effects of hosting a European Capital of Culture.

	Estimation 17 no controls	Estimation 18 micro & macro controls
Selection variable ECOC $t-4$	−0.0190	−0.0273
	(−0.151)	(−1.009)
Selection variable ECOC $t-3$	−0.0493	0.00458
	(−0.638)	(0.143)
Announcement variable ECOC $t-2$	−0.0668	−0.0664
	(−0.940)	(−1.431)
Announcement variable ECOC $t-1$	0.0112	−0.0246
	(0.172)	(−0.774)
ECOC t	−0.110	−0.0901**
	(−1.755)	(−2.334)
Legacy variable ECOC $t+1$	−0.0388	−0.0169
	(−0.736)	(−0.762)
Legacy variable ECOC $t+2$	−0.00604	−0.00483
	(−0.0880)	(−0.152)
Individual controls	No	Yes
Macro controls	No	Yes
Year fixed effects	No	Yes
Region fixed effects	No	Yes
Constant	3.052***	2.182***
	(75.83)	(30.60)
Number of observations	507,325	146,770
R^2	0.001	0.189

Notes: Dependent variable: Life satisfaction; ***: significant at the 99% level; **: significant at the 95% level. Robust clustered standards errors. *t*-statistic in parentheses.

sample, the nomination takes place 2 years before the event year. We include lagged-variables of the treatment dummy for the 4 years prior to the event. With the first two lags ($t-1$, $t-2$), we can capture announcement effects. The third and fourth lags ($t-3$, $t-4$) are called selection variables and help us identify causality issues. We also look at the 2 years following the event to check whether hosting an ECOC has a legacy effect on the average life satisfaction of the local population.[9] To control for macro- and micro-economic factors that have an impact on wellbeing, we perform the same regressions as in Estimations 1 and 3 (Table 3) – but we now include four lags and two leads of the treatment dummy (hosting an ECOC), representing selection and announcement effect variables. We are estimating:

$$LSi,j,t = \beta 0 + \beta 1 ECOCj,t-4 + \beta 2 ECOCj, t-3 + \beta 3 ECOCj,t-2 + \beta 4 ECOCj, t-1 + \beta 5 ECOCj,t + \beta 6 ECOCj, t+1 + \beta 7 ECOCj,t+2 + \gamma zi,j,t + \beta 2 mj, t + \omega j + \tau t + \varepsilon i,j,t \quad (2)$$

Estimation 17 includes socio-economic individual control variables. Estimation 18 includes individual controls as well as macro-economic controls and region and year fixed effects. Table 5 shows the regression specifications with selection and announcement effect variables and legacy effect variables.

In both specifications the coefficient of the treatment dummy (ECOC) is negative, significant, and has the same size as in the previous estimations. In the year of the event, life satisfaction in the treated region

decreases strongly and is significantly lower than in other regions.

Announcement effects can occur only after a city has been nominated, which takes place 2 years prior to the event. The nomination of a city could lead to an increase of happiness, by anticipation or economic stimulus. Happiness decreases if disturbance by construction works or re-allocation of public funds dominates. The insignificance of lags 1 and 2 speaks against anticipation effects, which could occur only after the announcement (or the positive and negative effects cancel each other out). The 3- and 4-year lags are the years before the nomination was announced. The insignificance of these selection variables lags rules out reverse causality, as it is not the case that the ECOC are hosted in regions that were already unhappier before the event or before the nomination took place. All four coefficients of the selection variables and announcement effects are insignificant, thus average life satisfaction follows the same pattern before the event.

Proponents of a mega-event often use positive legacy effects as an argument in favour of hosting such an event. However, the coefficients of the legacy effect variables 2 years after hosting the event (ECOC $t + 1$ and ECOC $t + 2$) are insignificant. This finding indicates that there are no positive (or negative) legacy effects on the average happiness of the local population. We measure the net effect on average happiness of the local population. As shown in section 'The effect on various socio-economic groups', the effect differs for different socio-economic subgroups. It might also well be that, at a given point in time, the effect of hosting an ECOC has positive *and* negative effects, which in turn, offset each other.

Conclusions

This study applies the Life Satisfaction Approach to measure the impact of a major cultural event on the subjective wellbeing of the local population. When a city is hosting the ECOC, the supply of culture increases substantially, with an average of 500 events taking place in the respective year. Previous economic studies concerning the ECOC focused on single economic indicators, such as tourism, construction or government spending, disregarding substitution effects or the crowding out of private investment. We investigate the impact of hosting an ECOC on regional GDP per capita and economic growth. Descriptive statistics suggest that hosting this event increases the GDP per capita and growth in the respective region. When estimating multivariate regressions with macro-economic control variables and time and region fixed effects, the correlation disappears. The higher average GDP per capita of regions hosting an ECOC is simply driven by the circumstance that this event takes place in urban regions.

We use the more comprehensive Life Satisfaction Approach, where each individual implicitly weighs the relative importance of advantages and disadvantages of hosting an ECOC. All estimates suggest a significant *negative* impact on the individual life satisfaction of the local population during the year in which the ECOC is hosted. We find no effect in the years after the event. Furthermore, hosting an ECOC has no effect in the 4 years prior to the event, thus ruling out causality problems. These would arise when the events were hosted in regions that are unhappier anyway.

Dissatisfaction during the event may be due to the high levels of public expenditure, increases in housing prices and criminality, disruptions through building sites and the influx of tourists in connection with the hosting of this mega-event. Many of these negative effects are likely to fall to a substantial amount on lower income groups. It is well known that, on average, such groups are more affected by higher rents and by crime

while at the same time they are less likely to attend the cultural events produced by the ECOC event (e.g. Frey, 2003). A possible increase in life satisfaction of higher income persons as a result of the cultural event may be overshadowed by the loss of lower income groups, especially because losses in life satisfaction loom larger than gains (e.g. Frey and Stutzer, 2002). Further research is needed to clarify the channels through which hosting an ECOC exerts influence on individual life satisfaction.

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Notes

1. All numbers on the financial situation can be found in (Palmer, 2004). Caution must be exercised when comparing the absolute amount, as different elements have been included in calculating the total expenditure by each city.
2. It can be considered exogenous because the local population, whose life satisfaction we measure, does not exert an influence to attract the event.
3. The Eurobarometer also comprises 48 surveys between 2002 and 2010. Nineteen of these include life satisfaction data. However, only three include the necessary control variables. Sixteen surveys do not include any information about income and number of children. Some do not include information on the occupation (employed, unemployed, retired). Because income is an especially crucial economic control variable for life satisfaction, we refrain from using the survey results that are from after 2002.
4. Austria and Northern Ireland did not host an ECOC in the time period under consideration; no data on the relevant time period and region exist for Norway.
5. The countries included in the empirical analysis are: Belgium, Denmark, Finland, France, Germany, Great Britain, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain and Sweden.
6. Further information on the variables is given in Table A2 of the Appendix. Descriptive statistics can be found in Table A3 of the Appendix.
7. Possible channels for a positive or negative impact of European Capitals of Culture on life satisfaction are cultural supply, prestige, education effect, noise, construction, trash, crime, tourism or an increase in prices. We cannot verify through which channel life satisfaction of the regional is influenced, since no data exist on the regional level (NUTS2), for enough countries and years for any of these factors.
8. The total effect of hosting a European Capitals of Culture on the unemployed is the sum of the coefficients for being unemployed, −0.0792, and the interaction-coefficient, −0.0905.
9. We do not include more leads, since our data set ends in the year 2002. By including three lags we would lose the years 2000, 2001 and 2002, and therewith 13 of our 24 Cultural Capitals. This would lead to biased estimates of the coefficient of the third lag.

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Appendix

Table A.1. European Capitals of Culture 1985–2012.

Year	European Capital of Culture	Year	European Capital of Culture
1985	Athens (Greece)	1999	Weimar (Germany)
1986	Florence (Italy)	2000	Avignon (France), Bergen (Norway), Bologna (Italy), Brussels (Belgium) Cracow (Poland), Helsinki (Finland) Prague (Czech Rep.), Reykjavik (Iceland) Santiago de Compostella (Spain)
1987	Amsterdam (Netherlands)	2001	Porto (Portugal), Rotterdam (Netherlands)
1988	Berlin (Germany)	2002	Bruges (Belgium), Salamanca (Spain)
1989	Paris (France)	2003	Graz (Austria)
1990	Glasgow (UK)	2004	Genoa (Italy), Lille (France)
1991	Dublin (Ireland)	2005	Cork (Ireland)
1992	Madrid (Spain)	2006	Patras (Greece)
1993	Antwerp (Belgium)	2007	Luxembourg (Luxembourg), Sibiu (Romania)
1994	Lisbon (Portugal)	2008	Liverpool (UK), Stavanger (Norway)
1995	Luxembourg (Luxembourg)	2009	Linz (Austria), Vilnius (Lithuania)
1996	Copenhagen (Denmark)	2010	Essen (Germany), Pécs (Hungary) Istanbul (Turkey)
1997	Thessaloniki (Greece)	2011	Turku (Finland), Tallinn (Estonia)
1998	Stockholm (Sweden)	2012	Guimarães (Portugal), Maribor (Slovenia)

Source: University network of the European Capitals of Culture.

Table A.2. Description of variables.

Variables used in GDP per capita estimations[a]	
Name	Description
GDP per capita (growth)	GDP per capita (growth) on regional (NUTS 2)
Population density	Population density on regional (NUTS 2) level
Sectoral shares	5 variables for the share of gross fixed capital formation on regional (NUTS 2) level: Agriculture, fishing industry, construction, wholesale and retail trade, financial intermediation
Human capital	5 variables for the share of students by level of education on regional (NUTS 2) level: Pre-primary education, primary, lower and upper secondary education (levels 1–3), post-secondary non-tertiary education (level 4), first and second stage of tertiary education (levels 5 and 6)
Variables used in life satisfaction estimations[b]	
Name	Description
Life satisfaction	Overall life satisfaction, measured through a four-point scale ranging from 0 ('not at all satisfied'), 1 ('not very satisfied'), 2 ('fairly satisfied') to 4 ('very satisfied')
ECOC	= 1 if the respective region hosts an European Capital of Culture in a certain year, 0 else (see Table 3.1 for a list of the respective cities)
ECOC $t-4$, $t-3$, $t-2$, $t-1$, $t+1$, $t+2$	Dummy variables taking on the value 1 if the respective region hosted an ECOC in following or previous years, 0 else.
Ln (Income)	Mean income computed from income groups of Eurobarometer Trend File. Transformed into USD by controlling for purchasing-power parity. Included in the estimations in a logarithmical form.
Education	Age of graduation. The higher the graduation age, the better educated an individual is.
Gender	= 1 if female
Age and Age^2	Age in years and age squared
Single, married, living together, divorced, separated, widowed	Marital status. Dummy variables taking on the value 1 if respondent belongs to the respective group
Employed, unemployed, retired	Employment status. Dummy variables taking on the value 1 if respondent belongs to respective group
No children, one child, two children, three children, four children	Number of children. Dummy variables taking on the value = 1 if respondent has respective amount of children
GDP per capita growth	GDP per capita growth on regional (NUTS 2)

[a]*Source*: Eurostat 1995–2011.

[b]*Source*: Eurobarometer 1980–2002; except GDP per capita: BAK Basel (1980–2002).

Table A.3. Descriptive statistics of variables conditional on hosting an ECOC.

Variable	Non-ECOC region		ECOC region	
	Mean	Std. Dev.	Mean	Std. Dev.
Life Satisfaction	3.05	0.75	2.94	0.77
Ln (income)	7.01	0.81	7.02	0.89
Size of household$^{1/2}$	1.68	0.43	1.66	0.44
Education	4.15	2.82	4.33	2.99
Unemployed	0.06	0.24	0.06	0.23
Retired	0.19	0.39	0.19	0.39
Gender (Man=1)	0.48	0.50	0.47	0.50
Age	43.45	17.96	42.66	18.01
Single	0.25	0.43	0.28	0.45
Married	0.55	0.50	0.52	0.50
Living together	0.06	0.23	0.06	0.24
Divorced	0.04	0.20	0.04	0.19
Separated	0.01	0.11	0.01	0.11
Widowed	0.08	0.27	0.08	0.26
No children	0.67	0.47	0.67	0.47
One child	0.16	0.37	0.17	0.38
Two children	0.12	0.33	0.11	0.32
Three children	0.04	0.19	0.03	0.18
Four children	0.01	0.10	0.01	0.10
GDP per capita growth	2.21	3.27	1.93	1.64
GDP per capita	19762.36	8768.96	22418.10	10929.24

Table A.4. The effect of hosting a European Capital of Culture on life satisfaction (diff-in-diff) estimated with ordered logit models.

	Estimation A1 univariate	Estimation A2 micro controls	Estimation A3 micro & macro controls
ECOC	−0.282	−0.390***	−0.245**
	(−1.776)	(−3.233)	(−2.362)
Ln (income)		0.803***	0.517***
		(12.86)	(19.91)
Size of household$^{1/2}$		−0.376***	−0.141***
		(−5.089)	(−5.196)
Education		0.0361***	0.0277***
		(5.345)	(7.370)
Employed		Reference	
Unemployed		−0.731***	−0.794***
		(−9.075)	(−16.01)
Retired		−0.0339	0.0695**
		(−0.744)	(2.499)
Gender (Man=1)		−0.108***	−0.111***
		(−5.821)	(−6.904)
Age		−0.0629***	−0.0584***
		(−20.18)	(−19.60)
Age^2		0.000716***	0.000620***
		(22.26)	(21.61)
Single		Reference	
Married		0.179***	0.277***
		(3.942)	(11.49)
Living together		0.0927	0.0191
		(1.661)	(0.611)
Divorced		−0.378***	−0.376***
		(−7.457)	(−10.57)
Separated		−0.516***	−0.556***
		(−9.044)	(−8.610)
Widowed		−0.221***	−0.171***
		(−6.137)	(−5.797)
No children		Reference	
One child		0.00655	−0.0575***
		(0.252)	(−3.230)
Two children		0.154***	−0.0316
		(4.221)	(−1.420)
Three children		0.312***	−0.0296
		(5.903)	(−0.731)
Four children		0.410***	−0.0875
		(4.659)	(−1.261)
GDP per capita growth			0.00129
			(0.268)
Year fixed effects	No	No	Yes
Region fixed effects	No	No	Yes
Constant	3.050***	1.512***	2.184***
	(73.99)	(11.48)	(30.41)
Number of observations	507,325	148,719	146,770
Pseudo R^2	0.000	0.058	0.099

Notes: Dependent variable: Life satisfaction; Coefficients estimated with ordered logit models. ***: significant at the 99% level; **: significant at the 95% level. Robust clustered standards errors. *z*-statistic in parentheses.