CEIS Centre for Economic and International Studies
TOR VERGATA

# CEIS Tor Vergata

RESEARCH PAPER SERIES

**Vol. 8, Issue 2, No. 164 – April 2010**

# *Accounting for Unobserved Country Heterogeneity in Happiness Research: Country Fixed Effects versus Region Fixed Effects*

Justina AV Fischer

# Accounting for Unobserved Country Heterogeneity in Happiness Research: Country Fixed Effects versus Region Fixed Effects

Justina AV Fischer[†]
CEIS, Tor Vergata University

*Abstract*

Many empirical studies are ambiguous about whether good formal institutions are conducive to subjective well-being or not. Possibly, this ambiguity is caused by cross-section models that do not account for unobserved cultural and institutional effects. Using the World Value Survey 1980-2005, this paper supports a positive relation in a country panel framework that accounts for unobserved, time-invariant country heterogeneity. This study also shows that using supra-national region dummies (by geography or language) in a country-random effects model appears to be a sufficient substitution for omitted country fixed effects.

Keywords: Happiness, life satisfaction, well-being, quality of life, institutions, democracy, rule of law, political constraints, policy implications, panel econometrics

JEL codes: I31, H10, H40, C33

*Acknowledgment*

The author thanks Christian Bjørnskov, Torberg Falch, Michael Funke, and Franco Peracchi for helpful comments and acknowledges financial support through a Marie Curie experienced researcher fellowship (RTN TOM).

[†] Centro di Studi Internazionali Sull'Economia e la Sviluppo (CEIS), Faculty of Economics, Università degli Studi di Roma 'Tor Vergata', Via Columbia 2, I-00133 Roma, e-mail: javfischer@gmx.de

## 1. Introduction and goal of paper

Previous analyses of the impact of formal institutions on subjective well-being (SWB), an empirical measure of individual welfare, have yielded inconsistent results (for a review, see e.g. Dolan et al., 2008.). These differences could be caused by limited data availability, varying samples of countries across studies, differing time periods, and arbitrary choice of highly correlated measures of institutions as regressors. For example, many previous studies differed with respect to whether democracy raises subjective well-being or not (see e.g. Frey and Stutzer, 2000, for a positive effect and Bjørnskov, Dreher and Fischer, 2008a, for an insignificant impact). Other formal institutions with ambiguous effects include the quality of the judicial system (the 'rule of law'), the degree of government efficiency, and government structures such as decentralization (see e.g. Ott, 2010; Bjørnskov, Dreher and Fischer, 2008a, b; Helliwell and Huang, 2008; Ovaska and Takashima, 2006).[1]

Many older happiness studies on institutional effects such as such as Frey and Stutzer (2000), but also more recent contributions such as Ott (2010), Helliwell and Huang (2008), focus mainly on the variation of institutions across countries/states. Using either cross-sections of data or time-series cross-section data, most commonly used estimation techniques are either (pooled) OLS or GLS random effects. The reason for this empirical approach, in particular its neglect of the time dimension so far, is that most political institutions and governance structures have been rather stable over time (the last 30-50 years), causing their available measures to be correlated too highly with any vector of country dummies. This high correlation implies that in most empirical models the effects of institutions cannot be (statistically) identified when country fixed effects are added.

The most recent study by Bjørnskov, Dreher and Fischer (2010) has improved on most of these shortcomings by (a) using a world-wide country panel of SWB and (b) testing all available measures of institutional quality. Most importantly, (c) they resolve the problem of high correlation among these institutional quality measures and their low within-country variation by constructing factor scores using a Principal Component Analysis (PCA), which gives rise to two

[1] See Bjørnskov, Dreher and Fischer (2009) for a more examples of inconsistent results and a thorough discussion of their possible causes.

orthogonal components with larger within-country variations: 'institutions guarding the economy and jurisdiction' and 'institutions relating to political decision-making'. Bjørnskov, Dreher and Fischer (2010) report a positive and significant effect of both economic-judicial and political institutions in pooled cross-sections derived from the World Values Survey (WVS), 1980 – 2005. Nevertheless, even though their model includes some dichotomous measures of geographic regions, they neglect to account for unobserved country heterogeneity.[2]

In sum, most past and recent empirical happiness models do not account for unobservable country heterogeneity through the inclusion of country fixed effects. Such unobservable time-invariant country characteristics include, for example, culture, history, response behavior, and formal institutions that are not captured by available measures. In micro-level happiness studies analyzing household panels, the use of individual fixed effects (which accounts for unobservable genes and childhood experience) is now well-established standard, and the severity of the bias from omitting them is now well recognized (Ferrer-i-Carbonell and Frijters, 2004). Analogously, not accounting for unobservable country heterogeneity in cross-country analyses causes a serious omitted variable bias on estimates of institutional effects - in case when such omitted country characteristics are correlated with these institutions. Thus, omission of unobservable country characteristics from the empirical model raises serious concerns about conclusions derived from observed impacts of institutions – affecting most of the existing happiness studies in this area. This concern is far from trivial and bears important real-world policy implications. This paper aims to show that, when effects of de facto time-invariant institutions cannot be identified in a model with country fixed effects, under certain conditions consistent estimates of these institutions can still be obtained in a country random effects framework.

To illustrate the concern described above, for example, let us look at the positive relation between (direct) democracy with subjective well-being identified in a couple of cross-sectional studies and random effects panel studies (e.g. Frey and Stutzer, 2000; Dorn et al., 2008). Let us assume that a certain population has a preference for discursive ways of political decision-making and therefore develops a strong (direct) democracy. Not accounting for unobservable population preferences, it

[2] Certainly, regional dummies approximate omitted country-specificities only insufficiently. For example, a regional dummy for 'Western Europe' includes rather dissimilar countries such as France, Greece, Germany and the U.K.

is unclear whether the positive estimate on the institution then indicates a beneficial impact of democracy or, alternatively, approximates simply the effect of population preference: Possibly, in correlation terms, populations preferring a discursive way of political decision-making may also be more trusting (e.g. Frey, 1997), be better socially networked (e.g. Freitag, 2006), and even be happier (e.g. Schyns, 1998). In other words, unobservable population preferences may relate to specific unobservable 'set-points' of population well-being, which manifest in observable formal institutions.[3] In that case, cross-national differences in formal institutions, shaped by those preferences, may just merely reflect heterogeneity in unobservable population set-points of subjective well-being.[4]

The goal of this paper is two-fold, methodological and policy-related: first, it aims to test whether the positive effects of high quality institutions for subjective well-being reported in previous cross-sectional and pooled sample studies hold true when a panel of countries is used and a model is estimated that accounts for unobservable time-invariant country characteristics such as culture and population preferences. This is achieved by estimating an empirical model with country fixed effects. In contrast to previous happiness research, this paper employs a novel composite institutional measure that is more volatile across time by far than the single-institution-measures that have been used in previous happiness analyses.

Second, this study also analyses how consistent estimates of the happiness effects of institutions can be obtained. Traditional textbook econometrics would predict that, most possibly, estimates on these institutions are consistent in a country-fixed effects model only. However, identifying effects of quasi time-invariant national institutions may be impossible when country fixed effects are added in the empirical model. In this paper we conjecture that consistent estimates of these time-invariant factors may still be achieved when the country fixed effects are replaced with supra-national region fixed effects, either defined by geographic proximity or ethnic distance (language). Such approach lets the country fixed effects submerge in the error term, like in a traditional random effects model - implicitly assuming that, when controlling for regions, unobservable

[3] The set-point theory assumes that there is a baseline level of happiness to which the individual tends to return after adaptation to a major (positive or negative) life event. On the population level, the SWB set-point would then be part of unobservable time-invariant country characteristics, while the observable happiness developments would then constitute 'fluctuations' around this baseline level. For empirical analyses of individual adaptation effects, see e.g. Clark et al. (2008), and Frijters, Johnston, and Shields (2008).

country characteristics are not correlated (any more) with the institutional measure(s). Using a new measure of institutional quality that varies sufficiently over time so that identification is possible in a country fixed effects model, this novel empirical approach is assessed by testing the equality of coefficients from such region fixed effects model (with country random effects) against the estimates from the traditional country fixed effects model (that excludes regions).[5]

Section 2 of this paper introduces the data, while section 3 discusses the difference between a random effects and a fixed effects model. Section 4 presents the empirical results and tests, while section 5 derives methodological and policy conclusions.

## 2. Data

This study starts by replicating the empirical models of the most recent happiness studies which use the largest sample of countries available and the broadest set of institutional quality measures (Bjørnskov, Dreher and Fischer, 2010, and Helliwell and Huang, 2008). To facilitate replication of these models and samples, comparable data and data sources are employed.

This study uses micro-data on personal attitudes and socio-demographic information of about 250,000 respondents in more than 80 countries from 1980 to 2005, provided by the World Values Survey (WVS). Subjective Well-Being (SWB) is measured as the share of population reporting the two highest categories (out of possible four) to the question: "Taking all things together, would you say you are 'very happy', 'rather happy', 'not very happy' or 'not at all happy'?".[6] In the

[4] Even though not stressed in this paper, the inclusion of country fixed effects also mitigates a potential bias through endogeneity (e.g. richer and thus happier people may choose to introduce democracy).

[5] The approach of this paper follows the historical development of empirical happiness research in Economics. We leave the evaluation of rarely encountered "hierarchical" models that have region-specific dichotomous variables and then, for each region, assume a region-specific random effects structure, to future research.

[6] Both the 'life satisfaction' question and the 'happiness' questions of the WVS are valid measures of the underlying construct 'subjective well-being'. The slightly higher volatility of the happiness question over time makes it suitable for a panel fixed effects framework. While the simple question 'How happy are you now ?' would just reflect an instantaneous affect (emotion), the question 'Taken all together, how happy are you ?' relates to a time-horizon spanning from now into the past and requires the respondent to 'step back' and make a cognitive evaluation. In addition, through using country fixed effects possible conceptual differences and translation issues across countries become negligible. See Fischer (2009) for a discussion of the conceptual differences between these two SWB measures and their econometric treatment.

regression sample, the mean is about 82%, with a standard deviation of 13 percentage points, a minimum of 38% and a maximum of 97%. Controlling variables for population characteristics like social trust (the population share that is trusting as opposed to distrusting), social capital (the average number of membership in clubs and activist groups in the population), and religiosity (the population share stating to believe in god as opposed to being atheist) are likewise obtained from the WVS.

This study employs two measures of quality of formal institutions, one relating to the political process, and the other relating to economic and judicial institutions, both obtained from Bjørnskov, Dreher and Fischer (2010). These are derived from eight different but correlated measures of institutional quality, including e.g. the Gastil index of civil liberties, the POLITY IV measure of democracy, the legal quality index from the Fraser Institute, and additional institutional measures developed by Helliwell (2006, based on Kaufman et al., 2009) and Henisz (2000). These two institutional factor scores were derived in a two-step procedure: first, each quality measure was regressed on GDP to account for the fact that richer countries tend to have better developed institutions. The residuals of these regressions were then used in a principal component analysis (PCA) that resulted in two orthogonal factors: 'institutions guarding the economy and jurisdiction' and 'institutions relating to political decision-making'. Please note that the interpretation of these two factors is directly derived from which of the eight institutional measures loads into which of the two components.[7] Each of these factors, being composed of several underlying institutional measures, exhibits a larger within-country variation than its single components do: the coefficients of variation (mean-standardized standard deviation) of the two factors are 8.6 and 30.9 (in absolute terms), while six of the eight components have a coefficients of variation between 3.0 and 8.4, and the remaining two lower than 10.9. This larger variation of the two institutional factors over time facilitates identification of institutional effects in the presence of country fixed effects.

Further controlling variables at the country level account for socio-economic development (divorce rate, unemployment rate, investment price level, trade openness, GDP per capita) and are obtained

[7] The factor 'institutions guarding the economy and jurisdiction' is mainly based on the measures 'honest and efficient government', 'democratic process', 'legal quality', and 'law and order'. On the other hand, the factor 'institutions relating to political decision-making' is mainly based on the institutional measures 'Gastil index', 'Polity IV index', and 'Political constraint III'. See also the factor loadings in Table A3 in Bjørnskov, Dreher and Fischer (2010).

from the World Bank and the Penn World Tables (Heston et al., 2006).[8] Supra-national region dummies include 'post-communist countries', 'Latin-American countries', and 'Asian countries'. Cultural regions are defined by language-group (e.g. 'Romance-language') or common history (e.g. 'Ottoman Empire'), and introduced in detail in section 4 (see also Table A3 of the Appendix).

Descriptive statistics of all these variables of interest and the controlling factors are described in Table A1 of the Appendix. These population attitudes and socio-economic country characteristics combined with the two institutional measures give rise to an unbalanced panel of 143 country-wave observations, covering 61 countries from the five WVS waves 1980 to 2005.

## 3. Methodology and Model

This section contrasts the fixed effects and the random effects models by deriving each from the more general two-way error components model, highlighting their conceptual differences.

The general two-way error components model is obtained from an econometric textbook baseline model (where 'i' denotes the observational unit and 't' denotes the time point)

$$y_{it} = x'_{it}\,\beta + u_{it}\,,$$

making the *additional* assumption that the disturbance term $u_{it}$ can be broken up into an individual-specific effect $\alpha_i$ , a time-specific effect $\lambda_t$ , and an idiosyncratic error term $\varepsilon_{it}$ :

$$u_{it} = \alpha_i + \lambda_t + \varepsilon_{it}\,.$$

Both $\alpha_i$ and $\lambda_t$ are 'fixed': they vary only across one of the two dimensions in the panel (either across observational units or across time), but are invariant in the alternative dimension. In contrast, both $\varepsilon_{it}$ and $x_{it}$ vary across both time and units.

[8] The relative investment price level (compared to the US level) reflects prosperity or growth prospects, as higher (expected) returns on investment should increase investment price. For a more thorough discussion, see Bjørnskov,

*3.1. The fixed effects model*

In the fixed effects (FE) model we assume that the vectors of individual-specific and time-specific effects ($\alpha_i$ , $\lambda_t$) are potentially correlated with the explanatory variables contained in $x_{it}$ . To avoid biasing the estimates of $\beta$, the 'fixed' effects ($\alpha_i$ , $\lambda_t$) are treated as unknown parameters to be explicitly estimated.

Applying this general two-way fixed effects model to our research question on how formal institutions impact subjective well-being, we obtain the following empirical specification:

$$SWB_{it} = I_{it}\,\eta + z'_{it}\,\beta + \alpha_i + \lambda_t + \varepsilon_{it} .$$

Subjective well-being in country i at time t ($SWB_{it}$) is a function of country i's institutional quality at time t ($I_{it}$), a set of controlling variables ($z_{it}$), a time fixed effect ($\lambda_t$), a country fixed effect ($\alpha_i$), and an error term $\varepsilon_{it}$ . This model directly takes account of unobserved time-invariant country heterogeneity such as culture and history by estimating a vector of country fixed effects ($\alpha_i$). In addition, also time fixed effects (wave effects, $\lambda_t$) are estimated that account for characteristics common to all countries observed during the same year of interview (e.g. global economic crisis, international political tensions).[9]

As the dependent variable is of a cardinal nature reflecting population shares of happy persons (theoretically on a continuous range from 0% to 100%), the FE-model could be estimated like any classical regression model (namely using OLS) if the number of units (N countries) is not too large. $\alpha_i$ is then empirically modeled by estimating unit-specific dummy variables (so-called LSDV model – least squares dummy variable model) which gives rise to country-specific intercepts. However, LSDV could lead to a loss in degree of freedom too large.

Further transformation of the FE-model allows us to apply OLS without this drawback: the (classical) mean-deviation form of the FE-model is obtained through substracting the group mean (average calculated over the T observations for identical country i ) for each model component,

---

Dreher, and Fischer (2008a).

[9] Please note that introducing time fixed effects constitutes a more flexible specification than assuming a time trend, which imposes a functional-form restriction on time effects.

which results in an elimination of the country fixed effects ($\alpha_i$).[10] Thus, de-meaned outcomes ($SWB_{it} - SWB_{i.}$) are regressed on the de-meaned variable of interest and covariates, ($I_{it} - I_{i.}$) and ($z_{it} - z_{i.}$) (plus the de-meaned time effects); applying ordinary least squares, the resulting estimator is also called 'within-estimator', indicating that only the time variation within countries is exploited.

In finite samples, the within-estimator for the coefficients $\beta$ and $\eta$ is BLUE (best linear unbiased estimator) as long as (1) the error term satisfies the standard assumptions (no heteroskedasticity, no serial or spatial correlation) and (2) the empirical model is true, meaning that no 'important' time-varying variables have been omitted.[11] The within-estimator for the coefficients $\beta$ and $\eta$ is consistent as T (number of time periods) or N (number of countries), c.p., approach infinity.[12]

Wooldridge proposed a test for the presence of first-order serial correlation of the idiosyncratic error terms in the panel data. In particular, under the null of no serial correlation, the residuals from the regression of the first-differenced variables should have an autocorrelation of -.5. The Wooldridge procedure performs a Wald test on the hypothesis that the estimated coefficient in a regression of the lagged residuals on the current residuals is -.5. The test did not reject the null hypothesis of no first-order autocorrelation of the error terms in our WVS panel data ($F(1, 13) = 1.22$, p-value = 0.29). Autocorrelation would make the estimated standard errors inconsistent and, consequently, the estimates on $\eta$ and $\beta$ inefficient (but not inconsistent), but also make many panel test statistics inapplicable.[13] The assumption of weak exogeneity of $I_{it}$ and $z_{it}$ is tested by means of a Wu-Hausman F-test: first, IV regressions (in which $I_{it}$ and $z_{it}$ are instrumented with their lagged values) and OLS regressions with country fixed effects are run. Then, assuming that the OLS estimates are consistent, the Wu-Hausman tests the equality of the IV and the OLS estimates. A rejection would indicate that IV estimations are meaningful and to be preferred over OLS estimates, and that $I_{it}$ and $z_{it}$ are not weakly exogenous (see also Baum, Schaffer, and Stillman,

[10] The mean of $\varepsilon_{it}$ is 0 by assumption.
[11] Serial correlation implies that observations of the same country over time are correlated, while spatial correlation occurs when observations of neighboring countries made at the same time point are correlated. The presence of spatial correlation is a rather new issue in applied econometrics. It takes account of, e.g., neighboring countries having a parallel development and mutual spill-overs, declining in geographic distance.
[12] OLS/LSDV estimation does not yield consistent estimators of the country fixed effects in the untransformed model.
[13] See Drukker (2003) and Wooldridge (2002) for further details. Regarding heteroskedasticity, significance levels of the estimated $\beta$ are basically identical when the sandwich estimator of variance is used. Results are available on request.

2003). The Wu-Hausman F-test does not reject the null hypothesis, consistent with the view that $I_{it}$ and $z_{it}$ are weakly exogenous ($F(10,9) = 1.25$, p-value = 0.37).[14]

*3.2. The random effects model*

For reasons of comparison, this study also presents random effects estimates. The random effects (RE) panel model comes closest to what has been presented in previous cross-sectional and pooled sample happiness research (e.g. Helliwell and Huang, 2008). We start again from the general two-way error components model introduced above,

$$y_{it} = x'_{it}\,\beta + u_{it} \quad \text{with} \quad u_{it} = \alpha_i + \lambda_t + \varepsilon_{it} \ .$$

The RE model assumes that time-invariant country characteristics $\alpha_i$ are neither correlated with the regressors $x_{it}$ nor with the idiosyncratic error $\varepsilon_{it}$ ($\varepsilon_{it} \sim IID(0, \sigma^2_\varepsilon)$). Country effects are assumed to be IID distributed with a mean of 0 ($\alpha_i \sim IID(0, \sigma^2_\alpha)$: In that case, they are *randomly* distributed and, thus, do not need to be explicitly estimated – they remain part of the (new) error term $\xi_{it}$ .[15] Estimates are obtained through generalized least squares (GLS) estimation, which is mathematically equivalent to calculating a matrix-weighted average of the between and within estimates.[16] Applying these insights to the question of how formal institutions impact subjective well-being across countries, the resulting empirical model looks as follows:

$$SWB_{it} = I_{it}\,\gamma + z'_{it}\,\delta + \lambda_t + \xi_{it} \ .$$

This model does not assume that time effects ($\lambda_t$) are random – they remain treated as unknown parameters that are explicitly estimated, following the traditional happiness models that employ

[14] However, the Kleibergen-Paap rank Wald statistic suggests that these instruments are only weak and the IV estimator might be biased.

[15] The composite error term is no longer idiosyncratic because of the equicorrelation structure implied by the presence of the random effect. This specification also implies a homoskedastic variance of the composite error term and serial within-country correlation over time.

[16] Each estimate is weighted with the inverse of its variance. In contrast, an OLS estimator gives equal weights to both estimates. Actually used is the feasible GLS estimator that as first step estimates the unknown covariance matrix of the error term, which is then used to transform the variables of the original model. The resulting regression model is then estimated using OLS.

pooled cross-sections (e.g. Blanchflower, 2008). Assuming that time-invariant country characteristics are not correlated with the regressors implies that a violation of this assumption would yield inconsistent estimates. Inclusion of individual-specific and time-specific fixed effects in the FE model yields consistent, but inefficient estimates – particularly if panels are small and the degree of freedom is strongly reduced. In contrast, in such small panels feasible RE estimates may be more efficient, but, as described above, require the strong assumption of mean independence of the random effects $\alpha_i$ from the regressors $I_{it}$ and $z_{it}$ .

Bjørnskov, Dreher and Fischer (2008a, 2010) where the first to include supra-national region dummies in their cross-sectional and pooled sample happiness regressions. In order to evaluate their empirical approach, this study presents the results of an empirical model which takes account of unobserved region heterogeneity through estimating region fixed effects, while assuming the country-specific effects to be random. Indeed, in a model in which supranational region dummies sufficiently pick up the unobservable cross-country variation (that lets national institutions appear correlated with unobserved country characteristics), the residual 'region-abstracted' country effects can then be assumed *not* to be correlated with these institutions. Thus, in such region fixed effects model the country-specific effects may then enter the (new) error term $\kappa_{it}$. From the viewpoint of countries, such model would then constitute a country-random effects model with region-fixed effects. In the empirical analysis, this model will be referred to as 'RE model with region effects'.

The empirical 'RE model with regions' looks then as follows, where $REG_i$ denotes a vector of supra-national region dummies:

$$SWB_{it} = I_{it}\psi + z'_{it}\eta + \lambda_t + REG_i + \kappa_{it} .$$

Again, the Wooldridge test of first-order autocorrelation did not reject the null hypothesis of no autocorrelation of the error terms in the WVS panel data on which the RE models employ ($F(1, 13) = 1.223$, p-value = 0.29.) The test statistics is identical with that for the FE-model – it is not affected by the inclusion of region or country fixed effects. The reason is that the Wooldridge test

builds on first differences of all variables.[17] Testing weak exogeneity in the way described in section 3.1., for both RE model versions, with and without region fixed effects, the Wu-Hausman F-test does not reject the null hypothesis - suggesting that weak exogeneity of $I_{it}$ and $z_{it}$ is given (F(10,39) = 0.52, p-value = 0.87; when region effects are added: F(10,36) = 0.34, p-value = 0.96).[18]

## 4. Results

This section is organized as follows: In a first step, we contrast the fixed effects estimates against the random effects estimates, making the same variable choice as in Bjørnskov, Dreher and Fischer (2010) - yielding a country-random effects model that includes supra-national region fixed effects (Table 1). In addition, also pooled OLS estimates (neglecting the country-specific effects $\alpha_i$) are presented. We finally test how coefficient estimates are affected when region dummies are excluded again from the RE model.

Table 1 presents the two-way fixed effects (FE) and the random effects (RE) results of how formal institutions influence population SWB in an unbalanced world panel 1980-2005. Columns 1 to 3 present the estimates for the baseline model, while columns 4 to 6 employ a more parsimonious model specification: to increase the degree of freedom, we exclude those controlling variables that are insignificant with a z-value roughly below unity. Columns 2 and 5 present the RE model with region fixed effects, while only column 6 excludes them. Column 3 presents the pooled OLS estimates for the baseline specification of column 2. The adjusted R2 gives information on the overall explanatory power of the estimated models. The difference between the adjusted R2 in models 4 and 6 suggests that about 20% of the variance are explained by country fixed effects.

[17] See Drukker (2003) and Wooldridge (2002) for further details. Regarding heteroskedasticity, significance levels are basically identical when the sandwich estimator of variance is used. Results are available on request.

[18] Employed instruments are, as before, the lagged values of the endogenous regressors $X_{it}$ and $I_{it}$ . However, the Kleibergen-Paap rank Wald statistic suggests that these instruments are only weak and the IV estimator might be biased.

Briefly turning to the controlling variables, in both FE and RE-with-region models (columns 1 and 2) more religious ('believing in god') and richer populations ('GDP') appear happier, as expected. In either model insignificant effects are observable for social capital, divorce, unemployment, trade openness, and the investment price level, our measure of economic prospect. In the RE model with regions (column 2), living in a post-communist country appears detrimental to SWB, an often reported finding. In this specific sample, persons in Latin-American countries are as happy as those in the comparison group, the Western countries, while Asian people appear in tendency happier. Only in the RE model is social trust positively associated with SWB and significant, but is insignificant in the FE model. This difference between column 1, including country dummies, and column 2, including region dummies, shows two things: first, it suggests that social trust effects are captured by the country fixed effects and, thus, are approximately time-invariant, a result conjectured by most of the trust literature (e.g. Uslaner, 2008).[19] Second, it also shows that social trust rather varies across countries than across regions, when employing our specific definition of supranational geographic region.

*4.1. Do formal institutions matter to happiness ?*

The focus of this first analysis is on the effects of the two quality-of-institutions measures on subjective well-being. An assessment of the robustness of their impact is done by comparing the estimates obtained from pooled OLS regressions, RE models and FE models (columns 1 to 3 of Table 1). Both institutional measures are included jointly in all models. Please note again that the RE models in columns 2 and 5 include region dummies. This country-RE models with region fixed effects come closest to the cross-sectional regression models estimated in past happiness research, as the comparison with the corresponding pooled OLS model (column 3) suggests.

The pooled OLS estimates in column 3 indicate that good economic-judicial institutions as well as the quality of the democratic process do matter to SWB (at the 1 and 10 percent levels of significance, respectively), perfectly mirroring the findings by Bjørnskov, Dreher and Fischer (2010) and Helliwell and Huang (2008).[20] We also find support for the finding that the economic-

[19] A comparison of models 5 and 6 yields that when regions are excluded from the RE model, the statistical significance of social trust is increased further.

[20] The estimate on 'democratic rule' is significant slightly below the 10 percent level when heteroskedasticity-robust standard errors are calculated.

judicial dimension of government quality dominates that of the political dimension (both in terms of coefficient size and statistical significance) (see also Ott, 2010).[21]

In the RE model with region effects (column 2), economic-judicial institutions are equally significantly associated with SWB. Furthermore, the coefficient on quality of the democratic process just misses the ten percent significance level.[22] The more parsimonious RE model specification that excludes the insignificant covariates (column 5) corroborates that *both* institutional dimensions are conducive to SWB.[23] Comparing the pooled OLS model estimates to those of the corresponding RE model (columns 2 vs. 3), we observe a well-known loss in efficiency in the RE model. According to the RE model estimates does the economic-judicial dimension play a more important role than the political dimension (both in terms of magnitude and statistical significance). Overall, these RE estimates (in column 5) of government institutions mirror well the positive effects obtained in previous cross-sectional or pooled sample happiness research (e.g. Frey and Stutzer, 2000).

The focus of this first analysis is the question whether institutions are still decisive for happiness once unobservable, time-invariant country characteristics are accounted for. In contrast to the RE model (with regions), the FE model specification takes account of unobserved and correlated time-invariant country heterogeneity by explicitly estimating country fixed effects. The answer to this question is given in columns 1 and 4, which report the FE estimates for the baseline model (column 1) and the parsimonious model (column 4). The results in both FE models clearly show that the quality of economic-judicial institutions matters to population happiness (significance at 10 percent level). In contrast, the FE estimate on the quality of the democratic process is rendered insignificant. However, the similarity of the institutional coefficients across the FE and the RE models (0.008 vs. 0.011) suggests that the statistical insignificance in the FE model is caused by collinearity of this quality measure with the included country fixed effects and the resulting loss in efficiency. On the other hand, the rather weak performance of the measure of democratic process in *both* RE and FE models is consistent with the observation that the pooling of poor and rich

[21] The beta coefficient is 0.18 for the eco-judicial dimension, but only 0.08 for the political dimension.
[22] In column 2, the region effects are jointly significant at the 1 percent level (chi2(3) = 21.21, p-value = 0.0001). In column 5, they are jointly significant at the 1 percent level (chi2(3) = 22.25, p-value = 0.0001).

countries in world samples causes a general statistical weakness of 'democracy' (see also Bjørnskov, Dreher and Fischer, 2010, who find that 'democratic process' matters to SWB only in middle- and high-income countries).

*Summary 1*

Overall, the FE model regressions support the RE (with regions) and pooled OLS model estimates: high quality government institutions are conducive to people's happiness. This finding is also supported by Hausman tests that contrast the consistent FE model estimates against the more efficient, but potentially biased RE model estimates (columns 1 and 2, columns 4 and 5); in both comparisons, the RE model with region effects is not rejected against the corresponding FE model.[24] We also find support in the FE model that institutions governing the economy and the jurisdiction are more important compared to institutions governing the political process, the identification of which appears difficult in the presence of country fixed effects, and when rich and poor countries are pooled together. Thus, the first important result of this analysis is that the quality of formal institutions remains conducive to subjective well-being - even when we control for unobservable time-invariant country characteristics such as culture and population preferences.

*4.2. Assessing models: contrasting using country fixed effects against using region dummies*

The second analysis in this paper sheds light on the question whether the inclusion of supra-national region dummies in country-RE models is a sufficient substitute for the inclusion of country fixed effects giving rise to a country-FE model – a question particularly important for identification of effects exerted by rather time-invariant national institutions. Certainly, the geographically narrower regions are defined, the closer they come to account for unobservable country characteristics. In most empirical cross-national happiness studies, geographical regions cover a large number of rather heterogeneous countries. For example, 'Western countries' include dissimilar states such as Greece and the U.K. – two countries with different languages and completely different histories (colonization by Ottoman Empire versus a British Empire colonizing other countries). The other group, 'post-communist countries', includes countries that are now

[23] The similarity of the institutional coefficients in columns 2 and 4 suggests that institutional effects are not correlated with the excluded (insignificant) controlling variables.

[24] These tests are discussed in more detail in the following section (full model: chi2(14) = 9.16, p-value = 0.8208, parsimonious model: chi2(10) = 8.78, p-value = 0.5529).

members of the European Union, as well as those still struggling with establishing stable institutions and a market economy. The focus of this section is on the question whether the inclusion of supra-national region dummies is sufficient for obtaining consistent institutional estimates, particularly when the option of estimating country fixed effects is not available to the researcher. To make such an assessment, Hausman tests are conducted on the difference in estimates between the FE model and the two types of RE models, one excluding and one including region dummies (column 4 versus columns 5 or 6).

As first step, we compare the traditional RE model with the FE model to gauge whether the RE model would yield consistent estimates of institutional effects. Comparing the traditional country-RE model (without region effects) with the country-FE model (columns 4 vs. 6), the Hausman test rejects the null hypothesis of non-systematic differences between estimated coefficients at the 5 percent level (chi2(10) = 20.73, p-value = 0.02). This finding mirrors most econometric textbook recommendations that the FE model is to be preferred over the traditional RE model (without regions). Clearly, not controlling for unobservable country heterogeneity appears to bias coefficient estimates and significance levels. The dissimilarity of the estimates between these two models supports the interpretation that institutions and controlling variables are correlated with unobservable country characteristics such as population preferences and culture.[25]

Does the inclusion of supranational region dummies prevent the bias in the traditional RE model from becoming systematic or too strong? The Hausman test on the RE model with region dummies and the FE model provides the answer (column 4 vs. 5): it confirms the hypothesis that the coefficients of the RE model with region dummies are not different in a systematic way from those of the FE model (chi2(10) = 8.78, p-value = 0.55). Thus, the Hausman test *does not* favor the FE model over the RE model with region dummies – rather, both appear equivalent. While the Hausman test rejects the null hypothesis for the traditional RE model, it does not so when supra-regional region fixed effects are added to this country-RE model.[26] In other words, including these

[25] This bias in the RE model is almost zero for institutions relating to the political process (0.008 vs. 0.009). Please note that this finding of no-correlation with unobserved country characteristics depends on the model specification and does not hold in general (see Table A2).

[26] Comparison of the RE model with region dummies with the RE model without region dummies (column 5 vs. column 6) reveals that the omission of region dummies deflates standard errors and increases coefficient sizes of the controlling variables. This indicates that geographical regions are sufficiently similar to share common socio-

region dummies is necessary for the non-rejection of the null-hypothesis of the Hausman test, namely that the RE model estimates are not severely and systematically biased through the omission of country fixed effects.

*Extension: parsimonious specifications*

Finally, given that unobservable country characteristics are correlated with observable country institutions, the omission of country effects may become the more severe the more parsimonious the model is specified. This could easily occur when data availability is limited, for example when information on social trust and religiosity was not available for all countries and years. Let us assume that as controlling variables only economic factors such as unemployment rate and GDP were available (like in Alesina et al., 2004); this assumption increases the sample size to 151 country-wave observations (outcomes are presented in Table A2 of the Appendix). Again, we observe the same pattern of rejection in the Hausman-tests: It clearly rejects the country-RE model without supranational region effects at the 5 percent level (chi2(8)=18.00, p-value = 0.02), but not the country-RE model that includes them (chi2(8) = 5.80, p-value = 0.67).[27]

Augmenting the traditional RE model (without regions) by the explanatory variables divorce and openness (but still omitting region dummies) yields a rejection of the RE model at the 1 percent level (chi2(9) = 33.27). However, increasing the set of explanatory variables further so that they include the complete set of socio-economic covariates (see e.g. column 1 of Table 1), the Hausman test does not reject the traditional RE model over the corresponding FE model (chi2(14) = 19.18, p-value = 0.16). This result suggests that country fixed effects are completely picked up by this broad set of observable socio-economic characteristics. We can thus conclude that with a complete set of controlling variables one can obtain (traditional) RE model estimates that are not systematically different from the FE model estimates. However, we also observe that when fewer controlling variables are available, the better strategy is to include supranational region fixed effects in the RE model.

---

economic traits (such as economic wealth, divorce behavior, religiosity), possibly caused by imitation effects, exchange of populations, and other types of spill-over across neighboring countries.

[27] The three region effects are jointly significant at the 1 percent level (chi2(3) = 55.13, p-value = 0.00). Please note that the bias in the parsimonious RE model (with regions) now affects both measures of institutional quality.

*4.3. Alternative definition of regions: regions based on shared culture*

The previous section (4.2.) has convincingly shown that the inclusion of geographical region effects in a country-RE model yields consistent estimates of the institutional variables of interest and the controlling factors. However, the question remains whether these advantageous findings depend on the definition on which the formation of these supranational regions is based.

The following Table 2 presents RE and FE estimates where regions are defined by language family and cultural heritage. The idea behind this approach is to group countries that are not homogeneous, but reasonably similar in their national culture – thus, such grouping may approximate shared country characteristics at the supranational level. The RE models in columns 2 and 4 employ the cultural regions 'Romance language', 'English-speaking', 'West- and North-Germanic language', 'Slavic language', 'Arabic language', 'Asian culture' and 'Ottoman Empire country'; the reference region includes countries around the Baltic Sea and one African country (Estonia, Finland, Latvia, Lithuania, as well as Trinidad and Tobago). Since some regions include less than 30 observations (= country-years), in columns 5 and 6 'Arabic' and 'Ottoman' have been merged into the new region 'Mediterranean-East', while 'Asian' becomes part of the (now) heterogeneous reference group. Table A3 of the Appendix presents how the 61 countries in the regression sample are grouped into these different cultural regions.

Column 1 of Table 2 presents the FE model results, exactly replicating column 1 of the previous Table 1. Column 2 of Table 2 presents the country-RE model estimates when dummies for the newly defined cultural regions are included. The region effects are jointly significant at the 1 percent level (chi2(7) = 55.30, p-value = 0.00). Compared to the reference group of people living around the Baltic Sea, English-, Germanic language speakers and people in Asian countries are happier.[28] Regarding the institutions, in both FE and RE models only eco-judicial institutions appear to matter to SWB (at the 10 and 1 percent level of significance), while the impact of political institutions is not significant, just missing the 10 percent of significance in the RE model.

[28] RE coefficient estimates for 'English' (0.175) and 'Germanic' (0.198) are statistically identical (chi2(1) = 0.24, p-value = 0.63). Please note that the Anglo-Saxon language also belongs to the group of West-Germanic tongues (Dutch, German, Swiss-German, Flemish, and Luxembourgian).

Coefficients on political institutions, are, however, quite similar across FE and RE models (0.007 vs. 0.01), as previously observed in Table 1.

Most important are the outcomes of the Hausman tests which compare the FE model estimates with the two RE model estimates. When regions defined by culture are included in the RE model, the Hausman test does not reject the null hypothesis, thus not rejecting the RE model with cultural regions (chi2(14) = 15.21, p-value = 0.36). In contrast, as discussed for Table 1, the Hausman test tends to reject the null hypothesis when regions are excluded and a 'traditional' RE model is estimated. In sum, when using supranational regions defined by culture and language the country-RE-with-regions-model appears to yield consistent estimates of the variables of interest.

*Extension: parsimonious specification*

Columns 3 and 4 of Table 2 present FE model and RE-with-cultural-regions model estimates when controlling variables with a z-value below unity are excluded from the original model specification (leaving 'trust', 'belief in god', 'divorce rate', and 'GDP per capita' as sole controlling factors). As regards institutional quality, high-quality eco-judicial institutions appear to matter for happiness in both FE and RE model (with regions) estimations (at the 5 and 1 percent levels, respectively). Now, in this parsimonious RE model, the measure of quality of political institutions is significantly associated with SWB (at the 10 percent level of significance), while it is still insignificant in the corresponding FE model. As before, coefficient estimates for the political institution appear rather similar across both models (0.008 vs. 0.011). Most importantly, the Hausman test does not prefer the country-FE model over the country-RE model when the latter includes supranational region dummies based on language and culture (chi2(10) = 2.42, p-value = 0.99). However, when these cultural region fixed effects are excluded from the RE model (estimates not reported), the Hausman test now does reject the null hypothesis of non-systematic differences in coefficients (chi2(10) = 20.73, p-value = 0.02), favoring the country-FE model.

*Employing larger cultural regions*

Some of the regions cover a rather small number of country-years which may hinder valid statistical inference. Thus, columns 5 and 6 present two variants of the RE model with regions where the 'Arabic' and 'Ottoman' countries are merged into a larger group ('Mediterranean-East'),

while the group of Asian countries becomes part of the new, larger reference group. Column 5 employs the full vector of controlling variables, while column 6 presents again the more parsimonious specification. In both RE models (columns 5 and 6), the quality of institutions guarding the economy and the judiciary is strongly associated with SWB. In contrast, the quality of political institutions shows no significant relation with happiness any more, with coefficients well below the 10 percent level of significance. Obviously, its standard error appears highly sensitive to which of the controlling variables are included and to how supranational regions are defined.

Finally, Hausman tests have been conducted for both full and parsimonious RE models with larger regions (columns 5 and 6, corresponding FE models are displayed in columns 1 and 3). For both RE models with larger regions, the null hypothesis is not rejected (chi2(14) = 9.38, p-value = 0.81; chi2(10) = 15.10, p-value = 0.13). Please recall from the previous paragraph that we have already shown that the RE model *without* region fixed effects is rejected, indicating that only the country-FE model yields consistent estimates. In sum, the Hausman tests again shows that the inclusion of supranational region dummies defined by culture in the RE model sufficiently 'debiases' the coefficient vector, compared to a traditional RE model that excludes any region fixed effects.

*Summary 2*

Taken all together, the various Hausman tests for Tables 1 and 2 suggest that the estimates on institutions from the RE model with supranational region dummies are not systematically different from the consistent FE model estimates. The institutional estimates, however, are not consistent when these region dummies are omitted from the RE model. This study also shows that it does not matter whether regions are defined by continent-bridging language groups or by geographical distance. Thus, the second important result of this study is that even when we are not able to account for unobservable time-invariant country characteristics through estimating country fixed effects, controlling for supranational region-specific effects appears to be a good substitute.

## 5. Conclusion

Recent happiness research identified a positive link between the quality of formal institutions (democracy, rule of law, etc.) and SWB, but failed to take account of unobservable country characteristics, potentially correlated with the variables of interest (e.g. Frey and Stutzer, 2000; Helliwell and Huang, 2008, Ott, 2010). For this reason, one could never exclude the possibility that observable institutions were a mere manifestation and approximation of unobserved time-invariant population preferences and cultural traits, and that observed positive relations did not reflect 'true' institutional effects.

This paper tests whether these previously observed institutional effects are sensitive to not-taking account of unobservable country heterogeneity, and whether the choice of a country-fixed effects model is to be preferred over alternative model specifications. If institutions are rather time-invariant in nature, country fixed effects tend to disguise impacts of these institutions. Using a country panel of population shares of happy persons derived from the World Values Survey 1980-2005 and a new measure of institutional quality, we find in two-way FE models that the quality of institutions (more so for economic-judicial institutions than for democratic process) matters to SWB. This paper also shows that the inclusion of supranational region fixed effects in a country-RE model yields results for institutions not systematically different from the country-FE model estimates. In contrast, not controlling for 'regions' in the country-RE model appears to severely bias the coefficient vector.

This paper bears two important implications for happiness research: a methodological one, and a policy-related. First, methodologically, this study shows for a world sample that the inclusion of supranational region dummies in a country-random effects model yields results not systematically different from country-fixed effects model estimates. This is good news to all happiness researchers who lack suitable data to apply panel estimation techniques, or whose variable of interest does not show sufficient variation over time to allow identification in a country-fixed effects model. 'Regions' constitute larger entities that comprise several units of analysis. We have shown that in a world context such regions may refer to groupings of countries not only by geographic proximity, but equally by continent-bridging language family or a shared history.

Second, from a policy-related point of view, this study reveals that most previous findings of happiness research with respect to government institutions are probably quite reliable. Our analyses show that even when the empirical model accounts for unobserved country heterogeneity, good formal institutions governing jurisdiction and the market economy are conducive to people's subjective well-being. The results for the effects of political institutions show a tendency toward being beneficial, but are statistically weak: statistical significance of the latter appears very sensitive to the choice of controlling factors, calling for a profound transmission channel analysis which is beyond the scope of this contribution. Thus, a final conclusion on the SWB effects of 'democracy' can only be made when longer country panels are available that allow this institution to vary stronger over time, so that its effects are unambiguously identifiable even in the presence of country or region fixed effects.

**References**

Alesina, A., R. Di Tella, and R. MacCulloch (2004), Inequality and happiness: are Europeans and Americans different?, *Journal of Public Economics* 88, 2009–2042.

Baum, C.F., M.E. Schaffer, and S. Stillman (2003), Instrumental variables and GMM: Estimation and testing, *Stata Journal* 3, 1–31.

Bjørnskov, C., A. Dreher, and J.A.V. Fischer (2010), Formal Institutions and Subjective Well-Being: Revisiting the Cross-Country Evidence, *European Journal of Political Economy*, 2010. DOI:10.1016/j.ejpoleco.2010.03.001

Bjørnskov, C., A. Dreher, and J.A.V. Fischer (2009), Formal Institutions and Subjective Well-Being: Revisiting the Cross-Country Evidence, MPRA Paper 17159, University Library of Munich, Germany.

Bjørnskov, C., A. Dreher, and J.A.V. Fischer (2008a), Cross-country determinants of life satisfaction: exploring different determinants across groups in society, *Social Choice and Welfare* 30, 119–173.

Bjørnskov, C., A. Dreher, and J.A.V. Fischer (2008b), On decentralization and life satisfaction, *Economics Letters* 99, 147–151.

Blanchflower, D.G. (2008), International evidence on well-being, National Bureau of Economic Research, NBER Working Papers 14318.

Clark, A.E., E. Diener, Y. Georgellis, and R.E. Lucas (2008), Lags and Leads in Life Satisfaction: a Test of the Baseline Hypothesis, *The Economic Journal* 118, F222–F243.

Dolan, P., T. Peasgood, and M. White (2008), Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being, *Journal of Economic Psychology* 29, 94–122.

Dorn, D., J.A.V. Fischer, G. Kirchgässner and A. Sousa-Poza (2008), Direct democracy and life satisfaction revisited: new evidence for Switzerland, *Journal of Happiness Studies* 9, 227–255.

Drukker, D.M. (2003), Testing for serial correlation in linear panel-data models, *Stata Journal* 3, 168–177.

Ferrer-i-Carbonell, A. and P. Frijters (2004), How important is methodology for the estimates of the determinants of happiness?, *Economic Journal* 114, 641–659.

Fischer, J.A.V. (2009), Subjective Well-Being as Welfare Measure: Concepts and Methodology, MPRA Paper 16619, University Library of Munich, Germany.

Freitag, M. (2006), Bowling the state back in: Political institutions and the creation of social capital, *European Journal of Political Research* 45, 123–152

Frey, B.S. (1997), An Institution for Knaves Crowds out Civic Virtues, *The Economic Journal* 107, 1043–1053

Frey, B.S. and A. Stutzer (2000), Happiness, economy and institutions, *The Economic Journal* 110, 918–938.

Frijters, P., D.W. Johnston, and M.A. Shields (2008), Happiness Dynamics with Quarterly Life Event Data, IZA Discussion Papers 3604.

Helliwell, J.F. (2006), Well-Being, Social Capital, and Public sector: What's new ?, *The Economic Journal* 116:C34–C45.

Helliwell, J.F. and H. Huang (2008), How's your government ? International evidence linking good government and well-being, *British Journal of Political Science* 38, 595–619.

Henisz, W.J. (2000), The institutional environment for infrastructure investment, *Industrial and Corporate Change* 11, 355–389.

Heston, A., R. Summers and B. Aten. (2006), *Penn World Tables, Version 6.2*. Center for International Comparisons (CICUP), University of Pennsylvania.

Ovaska, T. and R. Takashima (2006), Economic Policy and the Level of Self-Perceived Well-Being: An International Comparison, *Journal of Socio-Economics* 35, 308–325.

Ott, J.C. (2010), Good Governance and Happiness in Nations: Technical Quality Precedes Democracy and Quality Beats Size, *Journal of Happiness Studies*, forthcoming.
DOI: 10.1007/s10902-009-9144-7

Kaufman D., A. Kray, and M. Mastruzzi (2009), Governance Matters VIII: Aggregate and Individual Governance Indicators, 1996-2008, World Bank Policy Research Working Paper no. 4978.

Schyns, P. (1998), Cross-national differences in happiness: Economic and cultural factors explored, *Social Indicators Research* 43, 3–26.

Uslaner, E. (2008), Where You Stand Depends Upon Where Your Grandparents Sat: The Inheritability of Generalized Trust, *Public Opinion Quarterly* 72, 725–740.

Wooldridge, J.M. (2002), *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.

## Tables

Table 1: Institutions and happiness: fixed effects and random effects regressions

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Estimation method | FE | RE, with regions | Pooled OLS | FE | RE, with regions | RE, no regions |
| Average memberships | 0.018 | 0.009 | 0.009 | | | |
| | [0.49] | [0.34] | [0.32] | | | |
| Social trust (share) | -0.125 | 0.149* | 0.166** | -0.140 | 0.139* | 0.246*** |
| | [0.90] | [1.90] | [2.47] | [1.04] | [1.87] | [3.29] |
| Belief in good (share) | 0.345*** | 0.131** | 0.128*** | 0.356*** | 0.135*** | 0.210*** |
| | [3.02] | [2.57] | [3.16] | [3.23] | [2.73] | [4.78] |
| Divorce rate | -0.007 | -0.012 | -0.011 | -0.007 | -0.013 | -0.023*** |
| | [0.33] | [1.47] | [1.59] | [0.36] | [1.52] | [2.66] |
| Unemployment rate | 0.002 | 0.001 | 0.001 | | | |
| | [0.89] | [0.51] | [0.48] | | | |
| Log GDP per capita | 0.160** | 0.093*** | 0.090*** | 0.160** | 0.097*** | 0.136*** |
| | [2.01] | [4.71] | [5.28] | [2.31] | [5.42] | [8.79] |
| Trade openness | -0.0001 | 0.0002 | 0.0002 | | | |
| | [0.13] | [0.94] | [1.48] | | | |
| Investment price level | 0.0003 | 0.0001 | 0.0001 | | | |
| | [0.56] | [0.57] | [0.48] | | | |
| Quality of economic-judicial | 0.048* | 0.031** | 0.029*** | 0.046* | 0.034*** | 0.038*** |
| institutions | [1.79] | [2.48] | [2.89] | [1.77] | [2.82] | [2.94] |
| Quality of political institutions | 0.008 | 0.011 | 0.012* | 0.008 | 0.011* | 0.008 |
| | [0.78] | [1.60] | [1.66] | [0.86] | [1.72] | [1.21] |
| Post-communist country | | -0.113*** | -0.122*** | | -0.112*** | |
| | | [3.52] | [4.77] | | [3.66] | |
| Latin-American country | | -0.014 | -0.013 | | -0.023 | |
| | | [0.44] | [0.48] | | [0.75] | |
| Asian country | | 0.046 | 0.034 | | 0.047 | |
| | | [1.28] | [1.27] | | [1.43] | |
| Observations | 143 | 143 | 143 | 143 | 143 | 143 |
| Number of countries | 61 | 61 | 61 | 61 | 61 | 61 |
| Overall adjusted R2 | 0.8435 | 0.7097 | 0.7097 | 0.8496 | 0.7131 | 0.6412 |
| R2 within | 0.3925 | 0.2990 | | 0.3820 | 0.2917 | 0.2735 |
| Time fixed effects | yes | yes | yes | yes | yes | yes |
| Regional dummies | no | yes | yes | no | yes | no |
| Country fixed effects | yes | no | no | yes | no | no |

Notes: Dependent variable: share of respondents indicating the highest two categories 'very happy' or 'rather happy' (out of possible four) to the question "Taking all things together, would you say you are 'Very happy', 'Rather happy', 'Not very happy', 'Not at all happy'). Panel estimations with fixed effects (FE) or GLS random effects (RE). 'Pooled OLS' is estimated with OLS. '***", '**', '*' denote significance at the 1, 5, or 10 percent level, respectively.

Table 2: Institutions and happiness: using cultural regions

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Estimation method | FE | RE, with regions | FE | RE, with regions | RE, with regions | RE, with regions |
| Average memberships | 0.018 | 0.014 | | | 0.016 | |
| | [0.49] | [0.53] | | | [0.56] | |
| Social trust (share) | -0.125 | 0.113 | -0.140 | 0.125 | 0.170* | 0.173** |
| | [0.90] | [1.29] | [1.04] | [1.52] | [1.94] | [2.10] |
| Belief in good (share) | 0.345*** | 0.205*** | 0.356*** | 0.202*** | 0.218*** | 0.220*** |
| | [3.02] | [3.88] | [3.23] | [3.92] | [4.17] | [4.30] |
| Divorce rate | -0.007 | -0.015* | -0.007 | -0.017* | -0.023** | -0.024*** |
| | [0.33] | [1.67] | [0.36] | [1.90] | [2.48] | [2.65] |
| Unemployment rate | 0.002 | 0.001 | | | 0.0003 | |
| | [0.89] | [0.69] | | | [0.20] | |
| Log GDP per capita | 0.160** | 0.125*** | 0.160** | 0.121*** | 0.119*** | 0.121*** |
| | [2.01] | [6.10] | [2.31] | [6.62] | [5.68] | [6.40] |
| Trade openness | -0.00001 | -0.00001 | | | 0.00002 | |
| | [0.13] | [0.37] | | | [0.08] | |
| Investment price level | 0.0003 | 0.0001 | | | 0.0002 | |
| | [0.56] | [0.53] | | | [0.67] | |
| Quality of economic-judicial institutions | 0.048* | 0.039*** | 0.046* | 0.038*** | 0.033** | 0.034** |
| | [1.79] | [2.81] | [1.77] | [2.86] | [2.33] | [2.48] |
| Quality of political institutions | 0.008 | 0.011 | 0.008 | 0.012* | 0.007 | 0.007 |
| | [0.78] | [1.49] | [0.86] | [1.74] | [1.03] | [1.10] |
| Slavic culture | | -0.011 | | -0.009 | -0.079** | -0.076** |
| | | [0.25] | | [0.22] | [2.21] | [2.19] |
| Anglo-Saxon culture | | 0.029 | | 0.041 | -0.039 | -0.029 |
| | | [0.57] | | [0.89] | [0.85] | [0.69] |
| North- and West-Germanic | | 0.075* | | 0.080* | 0.002 | 0.011 |
| | | [1.66] | | [1.87] | [0.04] | [0.30] |
| Romance-language | | 0.013 | | 0.016 | -0.059 | -0.058* |
| | | [0.31] | | [0.41] | [1.63] | [1.77] |
| Arabic culture | | 0.046 | | 0.049 | | |
| | | [0.78] | | [0.84] | | |
| Asian culture | | 0.138*** | | 0.128*** | | |
| | | [2.90] | | [2.84] | | |
| Ottoman Empire | | -0.021 | | -0.021 | | |
| | | [0.45] | | [0.45] | | |
| Mediterranean-East | | | | | -0.071* | -0.068* |
| | | | | | [1.84] | [1.82] |
| Observations | 143 | 143 | 143 | 143 | 143 | 143 |
| Number of countries | 61 | 61 | 61 | 61 | 61 | 61 |
| Overall adjusted R2 | 0.8435 | 0.6751 | 0.8496 | 0.6798 | 0.6553 | 0.6617 |
| R2 within | 0.3925 | 0.3379 | 0.3820 | 0.3192 | 0.3090 | 0.2978 |
| Time fixed effects | yes | yes | yes | yes | yes | yes |
| Region dummies | no | yes | no | yes | no | yes |
| Country fixed effects | yes | no | yes | no | yes | no |

## Appendix

Table A1: Descriptive statistics

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Happiest (population share) | 143 | 0.83 | 0.13 | 0.38 | 0.97 |
| Quality of economic-judicial institutions | 143 | -0.03 | 0.82 | -2.76 | 1.57 |
| Quality of political institutions | 143 | -0.02 | 0.91 | -3.87 | 1.26 |
| Average memberships | 143 | 0.42 | 0.31 | 0.03 | 1.55 |
| Social trust (share) | 143 | 31.67 | 15.33 | 2.80 | 68.02 |
| Belief in good (share) | 143 | 0.42 | 0.27 | 0.07 | 0.99 |
| Divorce rate | 143 | 1.82 | 1.12 | 0.14 | 5.04 |
| Unemployment rate | 143 | 8.35 | 4.68 | 0.50 | 26.73 |
| Log (GDP per capita) | 143 | 9.50 | 0.63 | 7.85 | 10.78 |
| Trade Openness | 143 | 75.40 | 48.59 | 13.97 | 377.68 |
| Investment price level | 143 | 83.41 | 30.86 | 27.85 | 254.05 |
| Post-communist country | 143 | 0.24 | 0.43 | 0 | 1 |
| Latin-American country | 143 | 0.16 | 0.37 | 0 | 1 |
| Asian country | 143 | 0.08 | 0.28 | 0 | 1 |

Table A2: Economic controlling variables only

| | 1 | 2 | 3 |
|---|---|---|---|
| Estimation method | FE | RE, with regions | RE |
| Unemployment rate | 0.002 | 0.00001 | 0.00001 |
| | [0.72] | [0.00] | [0.01] |
| Log GDP per capita | 0.131* | 0.083*** | 0.102*** |
| | [1.85] | [6.71] | [7.37] |
| Quality of economic-judicial institutions | 0.036 | 0.029*** | 0.043*** |
| | [1.33] | [2.58] | [3.59] |
| Quality of political institutions | 0.016* | 0.008 | 0.009 |
| | [1.81] | [1.30] | [1.33] |
| Post-communist country | | -0.153*** | |
| | | [6.21] | |
| Latin-American country | | -0.002 | |
| | | [0.01] | |
| Asian country | | 0.032 | |
| | | [1.00] | |
| Observations | 151 | 151 | 151 |
| Number of countries | 68 | 68 | 68 |
| Overall adjusted R2 | 0.8309 | 0.6768 | 0.4835 |
| R2 within | 0.2800 | 0.2624 | 0.2574 |
| wave (year) dummies | yes | yes | yes |
| regional dummies | no | yes | no |
| country fixed effects | yes | no | no |

Notes: Dependent variable: share of respondents indicating the highest two categories 'very happy' or 'rather happy' (out of possible four) to the question "Taking all things together, would you say you are 'Very happy', 'Rather happy', 'Not very happy', 'Not at all happy'). Panel estimations with fixed effects (FE) or GLS random effects (RE). '***', '**', '*' denote significance at the 1, 5, or 10 percent level, respectively.

Table A3: Definition of cultural regions

| Region | Included Countries |
|---|---|
| Arabic | Egypt, Jordan, Malta, Morocco |
| Asian | Indonesia, Japan, South Korea, Singapore, Taiwan, Thailand, Vietnam |
| English (Anglo-Saxon) | Australia, Canada, Ireland, New Zealand, South Africa, United Kingdom, United States |
| Germanic (West and North) | Austria, Belgium, Denmark, Germany (West + East), Iceland, Luxembourg, Netherlands, Norway, Sweden, Switzerland |
| Ottoman | Albania, Cyprus, Greece, Hungary, Moldova, Turkey |
| Romance | Argentina, Brazil, Chile, Dominican Republic, France, Italy, Mexico, Peru, Portugal, Romania, Spain, Uruguay, Venezuela |
| Slavic | Bulgaria, Croatia, Czech Republic, Poland, Russia, Serbia, Slovak Republic, Slovenia, Ukraine |
| Mediterranean-East | ‘Arabic’ and ‘Ottoman’ |
| Reference Group | Estonia, Finland, Latvia, Lithuania, Trinidad & Tobago |