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Institutional Origins of Subjective Well-Being: Estimating the Effects of Economic Freedom on National Happiness

Rok Spruk · Aleskandar Kešeljević

Abstract   We exploit the cross-country differences in economic freedom to examine the link between the quality of institutions and subjective well-being. Using Veenhoven's happiness dataset, the evidence suggests countries with better economic institutions and higher level of economic freedom, captured by the security of property rights, open markets and more limited government, are significantly more likely to experience greater subjective well-being after controlling for structural confounders of national subjective well-being such as income, unemployment, inequality, social capital and life satisfaction. The effect of institutions on cross-national happiness is both significant and robust to different model specifications, estimation techniques and possible sources of endogeneity. Furthermore, our panel data analysis reveals that over time higher levels of economic freedom are associated with decreasing subjective well-being after controlling for state dependence and income.

Keywords Economic freedom · Happiness · Institutions · Well-being

1 Introduction

Since the fall of Berlin wall, the world underwent significant institutional and ideological changes. The crisis of welfare state in advanced industrialized countries of Western Europe, the collapse of communism in former Soviet Union and series of financial crises in

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East Asia and Latin America have led to significant changes in the set of economic policies aiming for removing barriers to entry, deregulating labor markets, liberalizing financial sectors and privatizing inefficient state-owned enterprises. The emphasis on private sector and innovation as primary growth engines has facilitated both ideological and paradigmatic shift towards free markets to promote economic growth and development. High rates of economic growth and institutional changes towards free markets, limited government and the rule of law in developing regions have lifted millions across from poverty across developing regions in Sub-Saharan Africa, East and South Asia, Latin America and Eastern Europe. Although both historical and contemporary evidence advocates the importance of inclusive political and economic institutions for growth and development (North 1991; Knack and Keefer 1995, 1997; Sokoloff and Engerman 1994; Acemoglu et al. 2001, 2002; Easterly and Levine 2003; Rodrik et al. 2004; Acemoglu and Johnson 2005; Eicher and Garcia-Peñalosa 2006; Acemoglu and Robinson 2010, 2012), the evidence on whether institutional change influences subjective dimensions of well-being is less clear. Whilst more inclusive political economic institutions tend to promote growth and development and reduce poverty, the evidence on the link between institutional changes and subjective well-being remains both puzzling and intricate since the empirical account on whether good institutions lead to higher levels of subjective well-being is scare. Yet, such an attempt to disentangle the effects of institutional change on subjective well-being and identify the channels of influence is a necessary step forward to examine in more detail whether changing institutional landscape determines the subjective dimensions of the quality of life.

The aim of our research is twofold. First, to present and establish an attempt to examine whether institutional differences contribute to the observed gaps in subjective well-being across countries. Compared to the existing attempts, our research aims to exploit the institutional heterogeneity as a possible source of cross-country differences in subjective dimension of well-being whereas the majority of existing studies focus on the objective well-being dimension, captured by income level or GDP per capita. Although each well-being measure is subject to inherent limitations, the underlying differences in subjective well-being comprise an important step forward in complementing the existing measures of well-being. And second, to examine whether institutional differences across countries influence subjective well-being independently of the existing factors recognized by the literature. Such an approach also presents one of the missing links in the large and growing literature on the effects of institutions on well-being and prosperity.

In this paper, we examine the hypothesis whether institutional changes, captured by the index of economic freedom, influence the subjective well-being. To this end, an attempt is presented to disentangle the effects institutions across countries on the subjective well-being. The outcome largely depends not only on our understanding of the concept of economic freedom, but also on its impact on our subjective well-being. The impact of freedom on happiness is determined indirectly through material endowments (freedom as an instrumental value) and directly through subjective satisfaction of our life (freedom as an intrinsic value) (Sen 1999; Veenhoven 2000a; Welsch 2003). Stylized empirical evidence inevitably suggests that happier societies typically enjoy higher level of material well-being. However, increase in income is not always accompanied by an increase in the level of happiness as advocated by within-country happiness trend in the United States since 1970s (Easterlin 1974). Thus, in the subjective sense happiness refers to the degree to which someone evaluates positively the overall quality of his life as a whole. People cannot be truly happy, if they do not enjoy the benefits of freedom in choosing the course of their own lives. For example, in transition countries unhappiness was a consequence of the fact

that individuals were not able to mold their own future and the subjective well-being thus depended on a robust level of freedom. On the other hand, transition countries in many respects have continued to score low on happiness due to depreciation of human capital, deteriorating public goods and rising income inequality (Guriev and Zhuravskaya 2009; Verme 2009).

Our primary goal in this paper is to examine the effects of institutional changes on subjective well-being by exploiting cross-country variation in the level of economic freedom to test whether the paradigmatic and ideological change towards limited government, free markets and rule of law has influenced the subjective dimension of well-being. The empirical evidence based on a sample of 136 countries suggests that after controlling for possible confounding factors advocated by existing literature such as income, unemployment rate, social capital, health and life satisfaction, inequality, religion and crime, higher level of economic freedom leads to greater subjective well-being. The results remain robust to a number of control variables and potential endogeneity. Compared to the cross-sectional analysis, the evidence from a limited panel of countries suggests higher levels of economic freedom over time tend to reduce the level of happiness even after addressing the potential endogeneity and after controlling for the effect of income and unemployment rate. Hence, our results confirm the importance of economic institutions in influencing subjective well-being. While societies with greater economic freedom are significantly more likely to experience higher average subjective well-being, higher economic freedom over time tends to decrease subjective well-being after controlling for multiple sources of unobserved heterogeneity.

The paper is structured as follows. In Sect. 2, subjective well-being, institutions, economic freedom and the underlying hypotheses are discussed in more detail. Section 3 presents data and methods. In Sect. 4, results are presented and discussed in depth. In Sect. 5, robustness checks, endogeneity and extensions of baseline results are presented. Section 6 concludes.

2 Subjective Well-Being, Institutions and Economic Freedom

2.1 A Note on Economic Freedom

In order to explore the relationships between economic freedom and happiness in detail we have to be familiar with the concept of economic freedom. Economic freedom includes (Hanke and Walters 1997; Johnson et al. 1998): (1) security of property rights, (2) freedom to engage in voluntary transactions, (3) access to sound money, (4) freedom to engage in voluntary transactions outside the borders, (5) freedom to compete, and (6) personal choice.

The cornerstones of economic freedom are protection of private property, personal choice, freedom of exchange and freedom to compete. The most comprehensive indexes of economic freedom today are *Index of Economic Freedom* by Heritage Foundation and Wall Street Journal and *Economic Freedom of the World*, by the Fraser Institute. The latter is divided into five areas and twenty-three components, with each component placed on a scale from zero (no freedom) to ten (full freedom). Index of economic freedom is divided into ten economic freedoms grouped into four broad categories. Each freedom is scored on a scale from zero (no freedom) to one hundred (full freedom). The index methodologies are intricate and complex, with different emphases (Kešeljević 2000). For example, some indexes weigh components equally (index of economic freedom) and some do not (Economic Freedom of the World).

There are a vast number of authors which all similarly found out that economic freedom does make a positive contribution to well-being. Countries that have higher economic freedom tend to have higher rates of growth (Easton and Walker 1997; De Haan and Sturm 2000; Scully 2002; Cole 2003; Berggren 2003; Gordillo and Alvarez 2003; Carlsson and Lundstrom 2002; Dawson 2003; Justesen 2008; Azman-Saini et al. 2010) and are more prosperous with respect to well-being as measured by GDP per capita (Hanke and Walters 1997; Farr et al. 1998) than those that have less economic freedom. Economic freedom also has a positive effect on many other aspects of human well-being like lower unemployment (Gwartney et al. 1997; Grubel 1998), higher life expectancy (Esposto and Zaleski 1999), more equal income distribution (Berggren 2003; Scully 2002), lower poverty (Connors and Gwartney 2010), better quality of healthcare and education (Stroup 2007) and better ecological consequences (Norton 1998). It seems that economic freedom is associated with many socio-economic benefits.

2.2 Measuring Happiness

Happiness is overall appreciation of one's life and it is defined as the degree to which a person evaluates the overall quality of his present life as a whole positively (Veenhoven 2001; Oishi et al. 2013). Happiness and life satisfaction are not synonyms since the former depends on the individual appreciation of her life while the latter is related to the extent of individual's control over her life (Veenhoven 1996). Since happiness is a conscious state of mind, it can be measured either by surveys, scales of positive and negative affects, mood analysis, frequency of positive emotional experience and analysis of facial expressions among other methods. The most common practice is a single direct question in the context of survey interview as "Taking all together, how happy you would say you are?" or "How satisfied are you with your life as a whole?". The development of different measurement techniques was accompanied by a discussion about the validity of survey questions (Diener et al. 2012). Veenhoven (2000a, b) proposed the quality of life classification based on two bi-partitions between life chances and life results on one side and between outer and inner qualities of life. Such dichotomy implies four qualities of life: (1) livability of the environment, (2) life ability of the individual, (3) external utility of life, and (4) inner appreciation of life. Watson et al. (1988) developed two 10-step PANAS[1] mood scales based on the extent of positive and negative affect since many existing measures of mood scale suffer either from inadequacy, low reliability and poor discriminant validity whereas Kahneman (1999) proposed instant utility approach towards happiness assessment along several dimensions. In addition, Weiss et al. (2008) used a large representative sample of twin pairs to examine the hypothesis that personality and subjective well-being share a common genetic structure, and demonstrate the importance of unique genetic influences and heritable differences from neuroticism, extraversion and conscientiousness linked to the levels of individual well-being. Diener and Tov (2012) and Kahneman et al. (2004) proposed national accounts of subjective well-being to assess various aspects of citizens' well-being such as positive emotions, trust in others, life satisfaction, meaning and purpose of life, engagement and interest. Such measures of well-being at periodic intervals not only redirect the attention on well-being as the ultimate end, but also inform policy debates to complement economic analyses.

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[1] Positive and negative affect schedule.

2.3 Income and Happiness

Economic freedom is often understood as a proximate goal, economic growth can be seen as an intermediate goal while improved objective and subjective wellbeing as the ultimate goal. However, many authors argue (Easterlin 1974, 1995, 2001; Caporale et al. 2009; Mentzakis and Moro 2009; Blanchflower and Oswald 2004; Diener and Oishi 2000; Myers 2000; Di Tella and MacCulloch 2006; Diener et al. 1995; Layard et al. 2012) that increase in income yields a lower increase in happiness at higher income levels. Easterlin (1974) was one of the first to note that increase in GDP per capita in the USA since the 1950s had not been accompanied by an increase in happiness. It means that per capita income has risen sharply, whereas average happiness has stayed constant or even declined in the same period. Recent studies have questioned the validity of Easterlin paradox and found no evidence of satiation point beyond which wealthier countries experience no further increases in subjective well-being (Stevenson and Wolfers 2008, 2013; Veenhoven and Vengust 2013). Other studies using individual-level happiness data have questioned the absence of satiation point in income-happiness relationship. For instance, Kahneman and Deaton (2010) tested the income-happiness hypothesis by analyzing the responses of more than 450,000 US residents in Gallup-Healthways Well-Being Index survey daily in 2008 and 2009 on their subjective well-being and questioned whether money can buy happiness. Their results suggest that emotional well-being rises steadily with income but there's no further increase beyond an annual income $US 75,000 while, on the other hand, low income exacerbates emotional pain and is associated with misfortune such as divorce, ill health and loneliness.

The need to complement national income accounts with subjective well-being as a broader aspect of human life has emerged as a growing and hotly debated topic in the literature (Diener and Suh 1997; Costanza et al. 2007, Fleurbaey 2009; Stiglitz et al. 2009). Many authors propose to measure and maximize national happiness (Helliwell et al. 2012; Layard 2005; Diener et al. 2000) while other authors oppose this idea (Nussbaum 2003, 2008). There has been a traditional suspicion among economists about the possibility of measuring subjective wellbeing. Standard economic theory namely points out the "objectivist position" which is influenced by the positivist movement. The word objective suggests indisputable truth and refers to assessment of the impartial outsider. The term subjective is interpreted as a matter of arbitrary taste and therefore unscientific since in subjective judgments people are apparently unable to produce an accurate and unbiased evaluation for experiences that extend over time (Schwarz and Strack 1999; Veenhoven 2001; Frey and Stutzer 2002; Clark 2003; Sunstein and Thaler 2003).

In order to overcome this bias happiness measures need to represent actual experiences as directly as possible. Moreover, the experiences they represent should be minimally influenced by context and standards of comparison. Due to the lack of proper empirical measures of happiness it was not possible for a long time to adequately approach the issues involving happiness. However, during the last four decades the research on happiness has made tremendous progress. A number of studies by economists, psychologists, sociologists and others have shown that happiness, through subjective experience, can also be objectively measured (Veenhoven 1991, 2001; Helliwell et al. 2012; Fleurbaey 2009).

2.4 Happiness: Causes and Correlates

Stylized empirical evidence advocates large and persistence happiness differences across countries inevitably necessitates a discussion on which factors help facilitate and

contribute to the overall subjective well-being. A substantial strand of happiness literature advocates the importance of social context and institutional variables both across countries and within nationally representative samples in influencing subjective well-being (Diener et al. 1995; Suhail and Chaundry 2004; Helliwell et al. 2009; Diener and Chan 2011). The subjective appreciation of life may largely depend on the life-cycle individual and social context characteristics as discussed in-depth by Easterlin (2006) and Plangol and Easterlin (2008). In a related study, Stevenson and Wolfers (2009) showed that despite marked improvements in the lives of women in the United States in the past 35 years, various measures of subjective well-being indicate a decline in female happiness both in absolute terms and relative to men. The observed decline is pervasive across demographic groups and industrialized countries, across multiple datasets as well as across various measures of subjective well-being. Relative decline in female happiness has evolved into happiness gender gap where women typically reported higher subjective well-being in 1970s compared to men.

Societies with a different set of perceptions and varying degrees of income and wealth inequality may experience different subjective appreciation of life since both absolute and relative income comparisons can facilitate endowments, abilities and extent of opportunities. The relevance of income inequality in accounting for cross-national differences in the subjective well-being has been confirmed empirically by Alesina et al. (2004), Headey et al. (2004), Berg and Veenhoven (2010), Oishi et al. (2011) and Rözer and Kraaykamp (2013). Cross-national studies indicate that people living in more unequal societies do not report lower subjective well-being than those living more egalitarian societies. Another strand of literature, using large-scale individual-level happiness reports, advocates that unfairness of economic inequality rather than inequality per se contributes to lower individual subjective well-being which has found empirical support in Graham and Felton (2006), Cramer and Kaufman (2011) and Haggard et al. (2013).

A growing strand of literature has emphasized the fundamental importance of social capital for subjective well-being (Putnam 2000; Isham et al. 2002; Helliwell 2006; Yip et al. 2007). Putnam et al. (1993) conducted a natural experiment by studying the institutional performance of Italian regions from 1970s onwards when Italian government established regional governments and showed that differences in contemporary institutional efficacy between the North and South (*Mezzogiorno*) can be traced back to the differences in various components of social capital such as trust in others, association and civic traditions that extend back to the Middle Ages. Given vastly different social, economic, cultural and political settings of Italian regions, their analysis reveals a clear North–South gradient with higher levels of well-being, trust, association and civic mindedness in the North and amoral familism with low social capital and lack of interpersonal trust in the South, which also corresponds to a substantial well-being gap. Other studies found ample empirical evidence to support the causal link between social capital, trust and subjective well-being (Diener et al. 2000; Gundelach and Kreiner 2004; Helliwell and Putnam 2004; Inglehart et al. 2008).

2.5 Happiness, Institutions and Economic Freedom: Hypotheses

Varying levels of subjective well-being across countries can be closely linked to society's institutional structure. Societies with inclusive political and economic institutions facilitate a level-playing field and broad distribution of political power which allows its citizens open access to markets, education and entrepreneurship whereas in societies with the set of extractive institutions, citizens suffer from concentrated *de facto* political power in the

hands of elites which facilitates economic institutions favorable to the elites at the expense of a broad cross-section of society (Acemolgu and Robinson 2012). Existing empirical evidence suggests economic, judicial and political institutions contribute significantly to cross-country subjective well-being where the effect of economic and judicial institutions dominates the effect of political institutions in low-income countries whilst the effect of political institutions dominates in middle-income and high-income countries (Bjørnskov et al. 2010).

The inclusiveness of institutional structure can be understood in the context of varying levels of economic freedom. Societies with greater economic freedom typically enjoy stronger rule of law, better protected property rights, greater market openness and better regulatory quality than those with lower extent of economic freedom. Hence, higher economic freedom corresponds to more inclusive economic institutions. Societies with more inclusive economic institutions are significantly more likely to embark on the path to higher economic growth which purports the question whether inclusive economic institutions also encourage greater subjective well-being (Rode 2013).

In a large cross-national study, Gropper et al. (2011) found a positive relationship between economic freedom and national happiness in a cross-section of more than 100 countries where the effect is particularly strong in less developed nations with lower degree of economic freedom. However, the estimated relationship lacks empirical clarity given insufficient number of control variables which raises the likelihood of omitted variable bias. Veenhoven (2000b) examined the effect of freedom on happiness in a comparative study of 46 nations in early 1990s in an attempt to disentangle which variants of freedom contribute most to happiness and under what conditions, and found strong zero-order and partial correlation between freedom and happiness, after controlling for possible effects of wealth. Personal and political freedom is significantly related to happiness in rich nations but not in poor nations, apparently suggesting that freedom does not pay in poverty. A reverse pattern has been found for economic freedom which is positively related to happiness in poor nations but not in rich nations and the strongest in nations where the capability to choose is the lowest.

The lack of evidence on the positive effects of economic freedom on happiness in rich nations can be explained by the trade-off between economic freedom and social cohesion. For instance, Scandinavian countries such as Denmark, Sweden and Iceland systematically view themselves as very happy whereas their governments are involved extensively in income redistribution and cohesive social policies based on egalitarian norms. Therefore, greater social cohesion rather than greater economic freedom can by and large yield the increase in subjective well-being, particularly in rich countries.

A notable characteristic of existing attempts to establish whether greater economic freedom breeds greater subjective well-being is the exclusion of relevant, systematic and important control variables. Lower subjective well-being is characterized by business cycles downturns (Oswald 1997; Di Tella et al. 2003), high unemployment rate (Winkelmann and Winkelmann 2000), crime, health and life dissatisfaction (Deaton 2008), religion, inequality, culture, civil war, social capital and other confounding factors indicated by the existing of the literature. It remains somewhat a puzzle whether greater economic freedom and more inclusive economic institutions as such contribute to greater subjective well-being once the structural characteristics are controlled for.

Our main hypotheses regarding the effect of economic freedom on subjective well-being can be summarized as follows:

H1 Greater extent of economic freedom improves the average subjective well-being and appreciation of life as whole after controlling for the effects of structural confounders such

as income, unemployment, social capital, life satisfaction, governance and political environment, labor market, religion and systematic shocks on subjective well-being.

H2 Rising economic freedom tends to improve subjective well-being over time after spatial heterogeneity and temporal shocks to cross-country happiness distribution is controlled for.

H3 The beneficial effect of economic freedom on average subjective well-being remains intact after omitted variable bias is addressed to tackle the possible channels of endogeneity of economic freedom to establish an exogenous and valid source of cross-country happiness variance and to obtain exclusion restrictions.

The aim of hypothesis H1 is to test the link between greater economic freedom and average subjective well-being across countries once the confounding well-being factors are appropriately controlled for. The quest of hypothesis H2 is to move beyond the cross-sectional character of empirical analysis and examine whether rising levels of economic freedom over time tend to improve subjective well-being after controlling for unobserved spatial and intertemporal effects. Furthermore, under hypothesis H3, our aim is to address the possible reverse causation, omitted variable bias and potential channels of endogeneity to identify the effect of economic freedom on subjective well-being and move from correlation towards a causal interpretation of the obtained results.

3 Data and Methods

3.1 Dependent Variable

Happiness can be defined as a mental and emotional state of well-being characterized by positive emotions such as feeling of joy, contentment, respect and smile although the definition varies across different approaches (Hartog and Oosterbeek 1998; Layard 2005; Klein 2006; Hadley 2013). Our dependent variable is 10-step numeral country-level mean individual happiness score. Happiness score is established from World Database of Happiness (Veenhoven 2013) on the basis of general surveys from among adult working-age population and is based on the proto-question: "Taken all things together on the scale from one to ten, how happy would you say you are?" Higher values on the scale indicate greater subjective well-being and appreciation of life as a whole whereas lower reported score corresponds to the lesser observed subjective well-being. As a direct measure of subjective well-being, happiness score reflects whether survey responds live in stable relationships which captures the emotive well-being connotation. Since survey-based happiness score is established from representative samples of adult working-age population, the score reflects reasonably unbiased evaluation of the appreciation of life from a broader cross-section of the population. On the other hand, life satisfaction concept encompasses cognitive well-being components, suggesting the extent of respondent's control over her life (Campbell et al. 1976; Lane 2001; Gundelach and Kreiner 2004; Diener et al. 2010).[2] The importance of happiness-based measures in various types of well-being and quality of life assessment has been highlighted by Costanza et al. (2007) and further emphasized by Watson et al. (1988), Kahneman (1999, 2011), Veenhoven (2000a), Weiss et al. (2008), Stiglitz et al. (2009) and Oishi et al. (2011). Alternatively, happiness level can be established by various

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[2] Thanks to the anonymous referee for highlighting the particular distinction.

Constant = 1.309, Coef = 0.076, t-stat = 8.21, p-value = 0.000, R2 = 0.3892, N = 139

Fig. 1 Subjective well-being and economic freedom across countries

methods, ranging from brain scans, blood sample analysis, observations of smile and voice tone, this paper proceeds with survey-based happiness score. As a dependent variable, 10-step happiness score reflects the welfare level of subjective well-being and the construction of a single index which can be compared both across space and time for a large number of countries whereas the cross-country comparison of alternative happiness measures is limited both spatially and temporally. Therefore, happiness score allows the cross-country comparison of emotional well-being by mean levels of subjective well-being inferred from the surveys both cross-sectionally and longitudinally. The spatial and temporal aspect of happiness-based subjective well-being index is essential in exploring the causal nexus between the level of economic freedom and happiness.

In Fig. 1, the aggregate relationship between 10-step average happiness score and the index of economic freedom is presented for a cross section of 139 countries.[3] The aggregate relationship suggests a positive relationship between average happiness and level of economic freedom since countries with greater extent of economic freedom enjoy significantly higher happiness score. In particular, each additional percentage increase in the index of economic freedom is associated with 0.07 point increase in subjective well-being. The point estimate is statistically significant at 1 % whereas the index of economic freedom explains about 38 % of cross-country variance in subjective well-being, captured by average happiness score.

In Fig. 2, real GDP per capita is plotted against the average happiness score for a base sample of countries to provide a preliminary examination of the income-happiness nexus. Real GDP per capita is adjusted for purchasing power parity (PPP) at 2005 constant prices which takes into account lower prices of non-tradable goods in less developed countries (Heston et al. 2012). The estimated relationship confirms a robust link between income level and subjective well-being. Each doubling of per capita income is associated with 0.75 point increase in average happiness score. The estimated relationship is statistically

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[3] In Table 12, the overview of sample size and country abbreviations used in Figs. 1 and 2 is provided.

Fig. 2 Income and happiness across countries

significant at 1 % and international income differences tend to explain about 57 % of cross-country happiness variance.

Invoking the famous Easterlin paradox, no evidence of the saturation point is found beyond which additional increase in income level would yield the corresponding improvement in subjective well-being. Although some countries on the scatterplot such as Costa Rica, Laos and Malawi, do enjoy substantially higher income level as compared to the inferred level from aggregate correlation between income and happiness, the significance of the aggregate correlation advocates a stable relationship that is not driven by outliers. Even when the estimated relationship is fitted by replacing linear ordinary least square estimator with logarithmic and higher-order polynomial trend curves, no evidence of Easterlin paradox is found on country-to-country basis which suggests that per capita income level is an important predictor of cross-country subjective well-being without diminishing returns to scale and saturation point at higher income levels.

3.2 Control Variables

In Table 11, the list of explanatory variables used in the empirical analysis is provided. The key explanatory variable in our analysis is the index of economic freedom which denotes the degree to which policies and institutions within countries support open markets, limited government, rule of law and regulatory efficiency. The index is based on the annual assessment of economic freedom across countries from *Heritage Foundation*. Index of economic freedom is constructed on the basis of ten different categories from the year 1996 onwards on the annual basis. Trade freedom, investment freedom and financial freedom comprise the open markets category. These sub-indices denote the presence of tariff and non-tariff barriers to international trade, restrictions on foreign and domestic investment activity as well as the efficiency of the banking sector, independence of the central bank, openness to foreign competition and government influence on the allocation of credit. Business freedom, labor freedom and monetary freedom comprise the regulatory efficiency category. Business freedom denotes the presence of quantitative restrictions on the ability

to start, operate and close the business. Labor freedom presents a quantitative measure of the government regulation of labor market through (1) minimum wages, (2) severance pay, (3) hiring and firing rules, and (4) rigidity of working hours. Monetary freedom comprises a unified quantitative index of price controls. Security of property rights and freedom from corruption comprise the rule of law category of overall economic freedom. The former sub-index denotes the individual ability to accumulate private property, secured by laws and institutions that are fully enforced by the state whereas the latter sub-index encompasses the perceived degree of corruption based on the annual assessment of corruption perception. And lastly, freedom from government spending and fiscal freedom comprise limited government category. The sub-index on freedom of government spending is constructed from the level of government spending in the share of GDP whereas the fiscal freedom denotes the unweighted average of quantitative tax burden such as (1) personal income tax, (2) corporate income tax and (3) total tax burden as a share of GDP, using quadratic cost function.

The overall level of economic freedom is constructed as an unweighted average of ten sub-indices to ensure a balanced composition of the index with respect to each category and sub-index of economic freedom. The constructed index is used as a measure of economic freedom. Compared to the economic freedom of the world (EFW) index from Fraser Institute (Gwartney et al. 2013), the constructed index of economic freedom captures the influence of polices and institutions in ten different areas whereas the assessment of economic freedom in the EFW index is based on five different areas, (1) size of government, (2) legal system and property rights, (3) sound money, (4) freedom to trade internationally and (5) government regulation. Although both aggregate indices share conceptually similar characteristics, index of economic freedom from Heritage Foundation captures additional areas of vital importance for exploring the institutional origins of subjective well-being such as business freedom, freedom from corruption and investment freedom. Specifically, the index of economic freedom additionally considers the role of taxes and government spending separately which allows us to further exploit this source of variation as a channel affecting the subjective well-being.

Following earlier attempts to establish the causal effects on subjective well-being (Easterlin 1974, 2001; Winkelmann and Winkelmann 2000; Deaton 2008; Graham and Felton 2006; Stevenson and Wolfers 2008; Berg and Veenhoven 2010; Rözer and Kraaykamp 2013; Oishi et al. 2013), three additional baseline explanatory variables are considered in our cross-country subjective well-being model: (1) income level, (2) unemployment rate, (3) life expectancy at birth, (4) Gini coefficient, and (5) health expenditure in the share of GDP. First, the data on GDP per capita is from Heston et al. (2012) and captures the effect of income level on subjective well-being. Real GDP per capita at 2005 constant prices is adjusted for PPP to take into account lower prices of non-tradable goods in countries with lower income levels. Second, the data on unemployment rate is from International Labor Organization (2013). Unemployment is defined as the share of labor force without work but available for and seeking employment. Third, the data on life expectancy at birth is from World Bank's *World Development Indicators*. Fourth, the data on Gini coefficient is from *Standardized World Income Inequality Database*. Gini coefficient captures the extent to which observed individual income distribution deviates from a perfectly equal income distribution. Gini coefficient ranges from zero (perfect inequality) to one (absolute inequality). Fifth, the data on health expenditure is from *World Development Indicators*. The ratio of health expenditure to GDP captures the contribution of public health to the subjective well-being which has been discussed extensively in the literature.

In exploring the institutional origins of subjective well-being based on cross-country evidence, the data on the quality of institutions is nonetheless essential in defining scopes and channels through which the institutional environment can impact the level of happiness. We exploit the cross-country institutional heterogeneity by sub-dividing the institutional environment into three key components: (1) governance measures and (2) measures of political freedom. The data on cross-country governance is from *Worldwide Governance Indicators*. Each indicator is standardized and ranges from −2.5 to 2.5 where higher values indicates better governance. Six different dimensions of governance measures are considered: (1) control fo corruption, (2) government effectiveness, (3) political stability and absence of violence, (4) regulatory quality, (5) rule of law, and (6) voice and accountability. We also consider the effects of war-caused disruption of armed conflict on subjective well-being by constructing a dummy variable for the civil war from *Conflict Encyclopedia* based on Uppsala Conflict Data Program.

The second sub-group of institutional indicators is based on the assessment of political freedom to examine the impact of political institutions on the level of subjective well-being. Three indicators of political freedom are considered. First, the index of political freedom from *Freedom House* reflects the ability to participate in voting and legitimate elections, to join political parties and run for office. The index captures the openness of electoral process, political pluralism, functioning of government and discretionary political rights. The index highlights the degree to which political institutions facilitate democratic institutional settings. The index ranges from 1 to 7 where lower values imply higher political freedom. Second, we also examine whether the ability to express concern to a public official affects the level of happiness based on the share of individuals who expressed concern to a public official. This variable is constructed from *Gallup World Poll*, based on the question "Have you voice a concern to a public official in the past month?", and captures the elements of direct democracy and political participation rather than the distinction between authoritarian and democratic governments. And thirdly, Polity IV index variable is used to examine whether democratic political institutions are more conducive to higher subjective well-being than authoritarian regimes. This variable denotes the extent to which a society is democratic or autocratic based on the seven categories, ranging from constraints on the executive to political competition (Marshall et al. 2012).

Besides economic and political freedom, the level of subjective well-being, captured by happiness, can also be affect by civil and religious liberties (Diener et al. 1995; Schyns 1998; Veenhoven 2000b; Inglehart and Klingemann 2000; Rice and Steele 2004; Bjørnskov et al. 2010). Three different indicators of civil and religious liberties are considered: (1) Freedom House index of civil liberties, (2) percentage of individuals who believe the place they live is a good area for racial and ethnic minorities and (3) percentage of individuals who believe the place they live is a good area for immigrants. We proxy the religious liberties by constructing a dummy variable for the presence of state religion based on the seminal contribution of Barro and McCleary (2005). However, proxying the religious liberty by a dummy variable for state religion merely omits substantial heterogeneity between countries. For example, while Islam is the officially established state religion in Muslim countries so is the Lutheran Protestantism in Scandinavian countries whereas this distinction does not imply that both groups of countries suppress religious freedom due to the presence of state religion since the level of religious freedom in Scandinavia is substantially higher compared to Muslim countries. This discrepancy and bias is overcome by constructing an interaction term between the dummy variable for state religion and dummy variable for the dominant religion per country to take into account possible institutional and religious heterogeneity across countries. Given the composition and heterogeneity of

our baseline sample, seven different religions are considered: (1) Protestant, (2) Catholic, (3) Eastern Orthodox, (4) Muslim, (5) Buddhist, (6) Hindu and (7) Jewish.

Subjective well-being can also be affected by adverse structural effects such as crime and violence (Campbell et al. 1976). We consider two covariates to control for possible effects of crime and violence: (1) percentage of adult population feeling safe walking alone at night in the area they live and (2) the percentage of the adult population being assaulted or mugged in the recent year. Both variables are constructed from *Gallup World Poll* and can be compared across countries. These two covariates allow us to control for possible adverse effects of crime and violence to prevent our baseline happiness model from omitted variable bias.

A large strand of literature suggests that various dimension of subjective well-being are affected by the social capital (Helliwell and Putnam 2004; Kingdon and Knight 2007; Yip et al. 2007; Winkelmann 2009; Sarracino 2010; Hooghe and Vanhoutte 2011). In a study of structural effects of social capital, Putnam constructed a composite measure of social capital across the United States and showed that states with high social capital index tend to experience better educational outcomes, higher child welfare, less TV watching, lower murder rates, better health, lower tax evasion, greater tolerance for gender, racial equality and civil liberties, lower economic inequality, greater civic equality and are less pugnacious. In this respect, we consider five different survey-based indicators of social capital from *Gallup World Poll*: (1) marriage rate, (2) volunteering, (3) helping strangers, (4) perception of family and friends' support and (5) frequency of charity donations.

We also control for the possible structural effects of trust and institutional confidence on happiness-based dimension of subjective well-being by considering three distinct measures: (1) the extent of general trust, (2) confidence in judicial institutions and (3) confidence in banks and financial institutions. The extent of general trust is constructed from the Gallup World Poll and denotes the percentage of respondents who agree that most people can be trusted. In a similar vein, confidence in financial and judicial institutions is inferred from the percentage of respondents who have confidence in banks and courts.

Although happiness and life satisfaction differ with respect to the emotional versus cognitive aspects, both measures of well-being tend to correlated both across space and time (Diener et al. 1995; Myers and Diener 1995; Diener et al. 2000) and both measures are associated with the perceived extent of opportunities (Veenhoven 2000a; Graham and Pettinato 2002). In this respect, we consider two satisfaction and three opportunity indicators based on *Gallup World Poll*. Living standard satisfaction rate and health satisfaction rate are constructed from the share of respondents in the survey satisfied with the material standard of living and personal health. In addition, this set of covariates is expanded by three opportunity indicators: (1) the share of responds who believe people in their country can get ahead by working hard, (2) perceived job availability (based on the share of respondents saying it's a good time to find a job), and (3) employment status which denotes the share of respondents with full-time employment. Opportunity indicators capture the extent of opportunities in the labor market that possibly influence the level of subjective well-being.

In Table 1, descriptive statistics and main percentiles is presented for the dependent variable, baseline explanatory variables and additional structural covariates in our cross-country happiness model.

Our dataset comprises a cross section of 139 countries for the period 1996–2011. In Table 12, a detailed regional breakdown of the sample is presented. In Fig. 3, non-parametric cross-country distribution of happiness and economic freedom is presented using kernel density curve. Both variables exhibit a similar type of the distribution with equal

Table 1 Descriptive statistics for the base sample

	Obs	Mean	SD	Min	Max	25th percentile	75th percentile	90th percentile
Dependent variable								
Average happiness	139	5.835	1.317	2.60	8.50	4.9	6.9	7.6
Baseline covariates								
Index of economic freedom	139	59.300	10.706	16.97	89.46	52.32	65.75	73.41
Real GDP per capita	139	10.946	12.159	313.94	62.864	1.868	15.230	31.153
Gini coefficient	139	38.714	8.856	22.70	65.28	31.76	45.12	51.24
Life expectancy (at birth)	139	67.775	10.432	40.47	81.58	60.08	75.56	79.08
Unemployment rate (%)	139	10.686	8.946	0.20	59.00	5.0	12.9	21.6
Health expenditure (% GDP)	139	6.481	2.249	0.30	16.39	5.03	8.02	9.33
Governance covariates								
Control of corruption	139	−0.040	1.040	−1.48	2.44	−0.842	0.405	1.915
Government effectiveness	139	0.027	1.012	−1.71	2.15	−0.732	0.751	1.756
Political stability and absence of violence	139	−0.215	0.947	−2.32	1.51	−1.015	0.581	1.051
Regulatory quality	139	0.066	0.956	−1.81	1.92	−0.605	0.923	1.548
Rule of law	139	−0.092	1.021	−1.73	1.94	−0.888	−0.418	1.647
Voice and accountability	139	−0.020	0.955	−1.89	1.60	−0.873	0.867	1.393
Civil War	139	0.215	0.412	0	1	0	0	1
Political freedom covariates								
Political rights	139	4.736	2.035	1	7	3	7	7
Expressed concern to public official (%)	139	19.294	8.173	5	41.6	13	24.7	30.8
Government type	139	5.184	5.375	−9	10	1	10	10
Civil and religious freedom covariates								
Freedom of choice	139	4.776	1.765	1	7	3	6	7
Tolerance of minorities	139	68.102	15.470	15.1	94.1	60.7	77.9	84.7
Tolerance of immigrants	139	64.884	15.336	20.8	93.4	55.4	76.4	84.8
State religion	139	0.376	0.486	0	1	0	0	1
Crime and violence covariates								
Feeling safe walking alone at night (%)	139	62.351	15.115	26	92	50.4	74.1	83.9
Physical assault rate (%)	139	7.660	6.466	0.6	38	3	10.2	16.6
Social capital covariates								
Marriage rate (%)	139	50.597	13.478	19	79	42.7	59.3	67.1
Volunteerism rate (%)	139	20.192	10.837	3.7	53.1	11	28.3	35.5
Helping strangers (%)	139	47.654	12.115	20.9	80.8	38.7	55.1	65.1
Family and friends' support (%)	139	79.877	12.978	30.3	97.9	73.7	90.3	93.2
Charity donation rate (%)	139	27.853	17.872	2.5	72.2	12.9	38.9	55.5

Table 1 continued

	Obs	Mean	SD	Min	Max	25th percentile	75th percentile	90th percentile
Trust and confidence covariates								
General trust (%)	139	24.34	12.99	3.8	74.2	14.8	31	41.9
Confidence in judicial institutions (%)	139	51.450	18.622	19.6	96.2	35.1	65.6	78.1
Confidence in banks and financial institutions (%)	139	59.111	17.734	14	98.4	45.4	70.7	81.7
Satisfaction and opportunity covariates								
Living standard satisfaction (%)	139	57.657	20.574	16.4	95.7	40.1	74.1	83.9
Health satisfaction rate (%)	139	77.983	8.931	50.6	91.4	73.1	84.1	88.8
Does working hard get you ahead (%)	139	80.645	15.813	28.8	97.1	74.2	92.8	95.2
Perceived job availability (%)	139	33.473	17.679	1	77.9	18.2	45.7	58.3
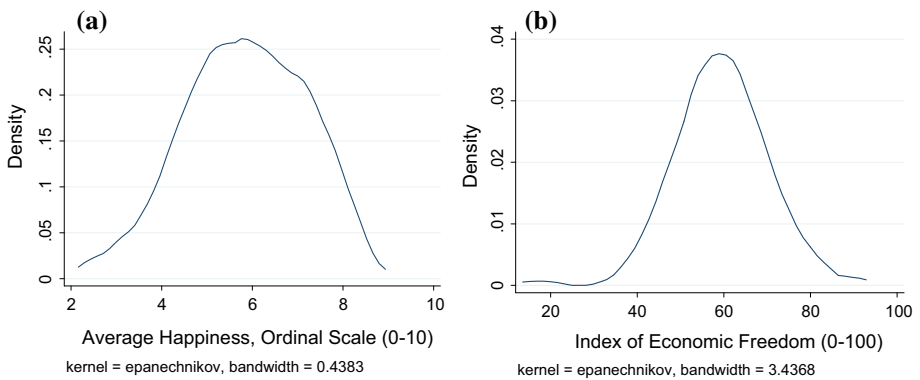
Fig. 3 Cross-country distribution of happiness and economic freedom. **a** Average happiness, **b** index of economic freedom

proportion of countries in both tails although happiness distribution is more unequal than the distribution of economic freedom. Panel (a) exhibits the distribution of average happiness while panel (b) exhibits the distribution of economic freedom index across countries.

The top 10 % of the happiness distribution consists of seven European countries (Denmark, Iceland, Switzerland, Norway, Finland, Sweden, and Luxembourg), four Latin American countries (Costa Rica, Mexico, Panama, Colombia) and the remaining two are Australia and Canada. The bottom 10 % of the happiness distribution comprises twelve Sub-Saharan African countries (Ethiopia, Cameroon, Niger, Mozambique, Kenya, Republic of Congo, Sierra Leone, Benin, Zimbabwe, Burundi, Tanzania, and Togo), one Middle Eastern country (Afghanistan) and one Latin American country (Haiti). The

estimated mean happiness score is greater than the median score which advocates slightly left-tailed distribution. Compared to the cross-country income per capita distribution, happiness distribution across countries features lower extent of inequality and lower dispersion around the mean as indicated by the estimated means and standard deviations in the descriptive statistics in Table 1.

The distribution of economic freedom is characterized by substantial differences between countries. Among top 10 % of the distribution countries, the highest level of economic freedom is observed in two East Asian countries (Singapore, Hong Kong), seven European countries (Switzerland, Ireland, United Kingdom, Luxembourg, Canada, Netherlands, Iceland) and the remaining three are United States, Australia and New Zealand. In the bottom 10 % of the distribution, the lowest level of economic freedom is observed in six Sub-Saharan African countries (Sierra Leone, Burundi, Angola, Republic of Congo, DR Congo, Zimbabwe), two South Asian countries (Vietnam, Laos), three Middle-Eastern countries (Syria, Sudan, Iraq) and three Eastern European and Central Asian countries (Bosnia and Herzegovina, Uzbekistan and Belarus). The heterogeneity of cross-country happiness distribution poses the central tenet of our hypothesis whether rising level of economic freedom yields the corresponding rise in subjective well-being, as captured by scale-based happiness level.

3.3 Empirical Model

The aim of the empirical analysis is to estimate the effect of economic freedom on the level of happiness across countries consistently. The basic cross-sectional model specification to examine the effect of economic freedom on the level of subjective well-being across countries that takes place is:

$$\hat{h}_{i,\bar{\tau}} = \varphi_0 + \hat{\alpha}_1 \cdot EF_{i,\bar{\tau}} + \hat{\delta}_1 \cdot \ln y_{i,\bar{\tau}} + \hat{\pi}_1 \cdot u_{i,\bar{\tau}} + \mathbf{X}'_{i,\bar{\tau}}\boldsymbol{\beta} + \mathbf{W}'_{i,\tau}\boldsymbol{\theta} + \varepsilon_i \qquad (1)$$

where h is the average happiness level for country i across the time period $\bar{\tau}$ where $\bar{\tau} = 1, 2 \ldots T$, EF is the index of economic freedom, $\ln y$ is per capita income level, u is the unemployment rate and the $\mathbf{X}$ captures systematic cross-country covariates of subjective well-being such as crime and violence, political institutions, religion, civil liberties, social capital, trust, life satisfaction and opportunity covariates whereas the vector $\mathbf{W}$ contains additional happiness covariates such as life expectancy, income inequality and health expenditure which allows us to capture the effects of health and inequality on subjective well-being. The term ε denotes the stochastic component of subjective well-being variation across countries. The primary coefficient of our interest is $\hat{\alpha}_1$ which captures the contribution of economic freedom to cross-country happiness level. The coefficient $\hat{\delta}_1$ captures the contribution of per capita income to cross-country happiness and allows us to re-assess the cross-country evidence on Easterlin paradox. The coefficient $\hat{\pi}_1$ represents the net contribution unemployment to the subjective well-being once the effects of economic freedom and income are controlled for. As a baseline covariate, unemployment rate allows us to control for possible macroeconomic effects on subjective well-being as suggested by Oswald (1997), Winkelmann and Winkelmann (2000) and Di Tella et al. (2003). Standard errors are adjusted to allow for possible heteroskedastic distribution of error variance and serially correlated error term using Huber–White sandwich fully robust variance matrix estimator for the conditional happiness distribution function (Huber 1967; White 1980).

4 Estimation Results

4.1 Baseline Results

In Table 2, the empirical results are presented based on the cross-country estimated happiness model specification. In column (1), the effects of economic freedom on happiness are considered from potential and structural covariates. In particular, our estimates imply that ten percentage points increase in the level of economic freedom is associated with 0.76 point increase in happiness-based subjective well-being, ceteris paribus, on 10-step numeral happiness scale. Excluding the baseline and structural control variables, differences in the extent of economic freedom explain about 38 % of the cross-country variance in mean individual happiness. In column (2), GDP per capita to the base sample

Table 2 Basic OLS cross-country estimates of economic freedom on happiness level, part I

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Economic freedom	.076***	.021***	.018**	.015*	.017**	.038***	.032**
	(.009)	(.008)	(.008)	(.008)	(.008)	(.013)	(.014)
Ln GDP per capita		.643***	.631***	.384***	.617***	.716***	.724***
		(.069)	(.069)	(.106)	(.075)	(.123)	(.151)
Unemployment rate			−.026**	−.022*	−.027**	−.025**	−.026***
			(.010)	(.011)	(.010)	(.011)	(.010)
Gini coefficient				.029***			
				(.009)			
Life expectancy				.053***			
				(.013)			
Health expenditure					.031		
					(.038)		
Control of corruption						.476*	.659***
						(.278)	(.283)
Government effectiveness						.109	−.002
						(.404)	(.417)
Political stability and absence of violence						−.123	−.162
						(.142)	(.137)
Regulatory quality						−.750***	−.657**
						(.307)	(.320)
Rule of law						−.371	−.533
						(.387)	(.421)
Voice and accountability						.327*	.336*
						(.183)	(.180)
Civil War							−.420**
							(.209)
N	138	138	138	138	138	138	138
F Test (Prob > F)	67.38	121.17	83.88	46.15	69.48	34.06	29.89
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R2	0.3840	0.5859	0.6154	0.6794	0.6215	0.6434	0.6557

The dependent variable is the 10-step numeral mean happiness level from Veenhoven (2013) based on World Happiness Database. Standard error are adjusted to allow for possible heteroskedasticity and serially correlated disturbances between countries using Huber–White sandwich variance matrix estimator. *Asterisks* denote statistically significant coefficients at 10 % (*), 5 % (**) and 1 % (***), respectively

specification to control for income effects and possible Easterlin paradox. The estimated coefficient indicates that 10 % rise in per capita income level is associated with 0.064 point increase in mean happiness level across countries, and is significant at 1 % level. In line with our expectations, the inclusion of GDP per capita as a structural covariate leads to the substantial reduction of the estimated magnitude of economic freedom coefficient from 0.076 to 0.021 which remains statistically significant at 1 %.

Lower magnitude of the economic freedom coefficient also suggests that without the inclusion of income level variable, the effects of economic freedom on mean happiness across countries are overestimated and, to a large extent, attributed to income effects on the level of economic freedom between countries. In column (3), the unemployment rate is added to the model specification. The estimated coefficient advocates large negative effects of unemployment on happiness-based subjective well-being which confirms earlier evidence on the strong inverse relationship between happiness and unemployment. Our point estimate suggests that each additional percentage point increase in unemployment rate is associated with 0.02 point decrease in mean happiness level and the estimated coefficient is statistically significant at 5 %. In addition, both coefficients on economic freedom and income level retain the established significance level and maintain stable magnitudes. Column (4) considers three additional covariates that capture the potential effects of inequality and life satisfaction. Aside from the positive effect of longevity on happiness, the estimated relationship suggests that more unequal societies tend to experience greater happiness once the effects of economic freedom, income per capita and unemployment rate are controlled for which is consistent with earlier findings by Rözer and Kraaykamp (2013). Moreover, the inclusion of life expectancy and Gini coefficient in the base model specification does not render the economic freedom coefficient insignificant since it is significant at 10 %. In column (5), we add the health expenditure variable to control for potential effects of public health on happiness whilst the effect is not statistically different from zero. On the other hand, the evidence confirms the systematic effects of economic freedom on subjective well-being since the established effect is significant at 1 %.

In column (6), institutional governance covariates are added to the base model specification to examine whether differences in the extent of happiness between countries can be explained by institutional origins and whether the impact of economic freedom on subjective well-being is independent from alternative institutional and policy outcomes. The evidence suggests that not all governance indicators affect happiness to the same extent since some indicators are invariably more discernable than others. Once governance covariates are added to the model specification, the effect of economic freedom is established at 1 % significance level which suggests that policies and institutions that either enhance or depress the level of economic freedom separately impact the extent of happiness between countries. The estimated effects of governance covariates suggest that societies with greater control of corruption and freedom of expression, captured by voice and accountability indicator, tend to experience greater subjective well-being whereas no evidence on systematic effects of the rule of law, regulatory quality, public sector effectiveness, and political stability is found. For instance, society may move towards greater rule of law and more efficient public sector and better regulatory policies. However, these policies add little to the well-being without a genuine freedom of expression and control of corruption which diverts both social and economic resources into unproductive use, decreasing income and well-being. In column (7), civil war dummy variable is added to the model specification the evidence suggests both large and significant detrimental effects of domestic conflict on subjective well-being, the effect of economic freedom on happiness remains significant whereas the inclusion of civil war dummy renders the income level

Table 3 Basic OLS cross-country estimates of economic freedom on happiness level with additional controls, part II

	(8)	(9)	(10)	(11)	(12)	(13)
Economic freedom	.013 *(.007)	.019* (.010)	.016** (.007)	.016** (.008)	.007 (.006)	.004 (.008)
Ln GDP per capita	.659*** (.084)	.694*** (.085)	.591*** (.069)	.686*** (.007)	.390*** (.066)	.813*** (.071)
Unemployment rate	−.029*** (.009)	−.022** (.010)	−.024** (.011)	−.028** (.012)	−.004 (.006)	−.011 (.009)
Political rights	−.095 (.087)					
Expressed concern to public official (%)	.032*** (.009)					
Government type	.030 (.027)					
Freedom of choice		−.084 (.071)				
Tolerance of minorities		.010* (.005)				
Tolerance of immigrants		−.0006 (.006)				
State religion			.706*** (.224)			
State religion × catholic			.160 (.280)			
State religion × muslim			−.607*** (.239)			
State religion × orthodox			−.959*** (.323)			
State religion × buddhist			−.768** (.328)			
State religion × hindu			−.193 (.254)			
State religion × jewish			−.487** (.283)			
Feeling safe walking alone at night (%)				−.001 (.005)		
Physical assault rate (%)				.020 (.016)		
Living standard satisfaction					.030*** (.004)	
Health satisfaction					.011 (.007)	
Does working hard get you ahead						.019*** (.004)
Job opportunities						.008** (.004)
N	138	138	138	138	138	138
F Test (Prob > F)	52.85 (0.000)	47.19 (0.000)	43.99 (0.000)	55.05 (0.000)	94.57 (0.000)	66.83 (0.000)
R2	0.6549	0.6286	0.6778	0.6248	0.7694	0.6903

The dependent variable is the 10-step numeral mean happiness level from Veenhoven (2013) based on World Happiness Database. Standard error are adjusted to allow for possible heteroskedasticity and serially correlated disturbances between countries using Huber–White sandwich variance matrix estimator. *Asterisks* denote statistically significant coefficients at 10 % (*), 5 % (**) and 1 % (***), respectively

coefficient insignificant which advocates persistent adverse effect of major structural shocks such as war and violence on the level of subjective well-being which trumps the contribution of other relevant characteristics to the well-being. Together the level of economic freedom, institutional governance covariates, civil war, income level, unemployment rate account for up to 65 % of the cross-country variance in mean happiness score which highlights the relevance and importance of institutional origins with respect to the cross-national differences in subjective well-being.

In Table 3, the base model specification is expanded by the set of covariates related to political freedom, freedom of choice, religious freedom, crime and violence, satisfaction and opportunity covariates. The purpose of expanding the model specification is (1) to examine the stability of economic freedom coefficient and (2) to consider whether the effect of economic freedom on happiness can be considered independent of political and religious freedom as well as other potential happiness covariates. In column (8), the specification is expanded by the political rights variable and the evidence does not suggest a discernable and significant relationship between the extent of political freedom and mean happiness level. A possible explanation for zero effect of political rights on happiness might be the bias triggered by objective ordinal indicator such as Freedom House political rights indicator. Although a fraction of economic freedom coefficient is reduced due to the inclusion of political rights variable, the effect of economic freedom on happiness level is still significant at 10 %. Zero effect of political rights is challenged by adding the survey-based variable which denotes the percentage of the adult population who expressed concern to a public official to the specification. The coefficient on this variable, which captures the ability of citizens to express concern to public officials, is statistically significant at 1 %, and suggests that holding everything else constant, societies with greater ability to voice concerns to the government and officials are significantly more likely to experience higher level of subjective well-being. In addition, Polity IV variable, which denotes the normalized extent of political democracy, does not suggest that citizens in more democratic countries experience higher mean happiness level as a result of democratic political institutions per se. Therefore, our evidence casts a systematic effect between the nature of political system, proxied by the ability to voice a concern to public officials, and subjective well-being to some extent, the impact of economic freedom on happiness can be considered independent from the extent of political freedom.

Significant effects of economic freedom on subjective well-being could be accounted for by the effects civil liberties and freedom to choose. In column (9), the model specification considers three potential cross-country freedom of choice variables such as (1) Freedom House ordinal freedom of choice indicator, (2) the percentage of citizens tolerating minorities, and (3) the percentage of citizens tolerating immigrants. Intuitively, subjective well-being level should respond positively to greater freedom of choice whereas greater intolerance towards minorities and immigrants should decrease mean well-being. The evidence suggests a robust and significant effect of economic freedom on subjective well-being and persistent negative effects of falling income and rising unemployment on happiness. Although societies with greater tolerance of minorities are slightly more likely to experience higher level of subjective well-being, the extent of freedom to choose and tolerance of minorities is not likely to affect well-being to a significant degree. Independent of the freedom of choice, ten percentage point increase in economic freedom index is associated with additional 0.19 point increase in subjective well-being level, holding the effect of income and unemployment constant.

Can the effects of economic freedom be considered independently of the effects of religious freedom on subjective well-being? In column (10), the distinction of these two

types of effects is tested. The specification is augmented by the dummy variable for the state religion from Barro and McCleary (2005). State religion dummy variable is interacted with a dummy variable for the major religion to control for possible religious heterogeneity between countries. The evidence advocates a strong and persistent effects of economic freedom on subjective well-being since the obtained coefficient is significant at 5 % after controlling for possible effects of religious freedom on happiness. Although countries with established and constitutionalized state religion are significantly more likely to experience higher subjective well-being, a considerable heterogeneity with respect to the type of religion is confirmed. The coefficients on interaction terms suggest that, relative to Protestant countries, societies with Muslim, Eastern Orthodox, Buddhist and Jewish state religion are significantly more likely to experience lower subjective well-being levels whereas insignificant differential effects are found for Catholic countries. In column (11), we further control for the possible effects of crime and violence, captured by the physical assault rate and percentage of citizens feeling safe to walk alone at night, on subjective well-being levels and the estimated coefficients suggest insignificant effects of crime and violence on subjective well-being. In column (12), the effects of life satisfaction and health satisfaction on subjective well-being are controlled for. Our evidence suggests large and significant effects of life satisfaction on mean happiness levels whereas insignificant effect is found for health satisfaction. Not surprisingly, the inclusion of life satisfaction variable renders the economic freedom coefficient insignificant. In addition, higher levels of subjective well-being can be driven by the extent of opportunities which allow citizens to pursue among other things, as US declaration of independence asserts, the pursuit of happiness? In column (13), the base model specification is augmented by two opportunity variables, indicating the set of opportunities: (1) survey-based share of respondents who agree that hard work allows citizens to get ahead, and (2) the percentage of citizens satisfied with job opportunities in the labor market. The evidence suggests that both the returns from hard work and job opportunities are significantly more likely to improve the level of subjective well-being although the former seems to affect subjective well-being to a considerably larger extent than the latter.

A large strand of literature suggests that individual happiness is largely influenced by social capital such as trust, social interactions and civic traditions (Putnam 2000; Helliwell and Putnam 2004; Winkelmann 2009; Leung et al. 2011; Helliwell and Barrington-Leigh 2011; Rodriguez-Pose and von Berlepsch 2011). Table 4 introduces the estimated empirical happiness model with social capital and trust covariates. In columns (14) through (18), we control for the effects of social capital on happiness to check for the stability of effects of economic freedom. The evidence largely confirms the importance of social capital with respect to country-level happiness differences. Societies with better social capital endowment achieve consistently higher country-level mean individual happiness. The importance of social capital is confirmed across different specifications and different measures. For instance, increasing the share of citizens participating in voluntary activities by 10 % is associated with 0.2 point improvement in mean happiness score. Similarly, societies with more people helping strangers, greater support of family and friends and higher charity donation rate achieve systematically higher level of subjective well-being. The effects of economic freedom remain intact after the effects of social capital are controlled for are in the range of 0.12 and 0.15 for each ten percentage point increase in economic freedom index which confirms our expectations on the independent effect of economic freedom from social capital covariates.

In columns (19) and (20), the base empirical model specification is augmented by trust and institutional confidence variables. The evidence suggests large and systematic effects

Table 4 Basic OLS cross-country estimates of economic freedom on happiness level with additional controls, part II

	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Economic freedom	.015* (.008)	.013* (.007)	.013* (.008)	.015* (.008)	.012 (.007)	.015** (.008)	.017** (.008)
Ln GDP per capita	.641*** (.070)	.634*** (.067)	.653*** (.067)	.515*** (.081)	.553*** (.077)	.629*** (.069)	.631*** (.085)
Unemployment rate	−.029** (.011)	−.021** (.011)	−.025** (.011)	−.023** (.011)	−.021** (.010)	−.025*** (.009)	−.025** (.011)
Marriage rate (%)	−.009 (.006)						
Volunteerism rate (%)		.024*** (.005)					
Helping strangers (%)			.017*** (.005)				
Family and friends' support (%)				.021*** (.007)			
Charity donation rate (%)					.015*** (.003)		
General trust						.008* (.005)	
Confidence in judicial institutions (%)							.003 (.004)
Confidence in Banks and Financial Institutions (%)							−.0008 (.004)
N	138	138	138	138	138	138	138
F Test	61.37 (0.000)	75.74 (0.000)	71.24 (0.000)	69.74 (0.000)	84.62 (0.000)	78.99 (0.000)	52.78 (0.000)
R2	0.6242	0.6522	0.6411	0.6431	0.6443	0.6227	0.6178

The dependent variable is the 10-step numeral mean happiness level from Veenhoven (2013) based on World Happiness Database. Standard error are adjusted to allow for possible heteroskedasticity and serially correlated disturbances between countries using Huber–White sandwich variance matrix estimator. *Asterisks* denote statistically significant coefficients at 10 % (*), 5 % (**) and 1 % (***), respectively

of general trust on mean individual happiness whereas the estimated effects of institutional confidence do not advocate a significant relationship between confidence in financial and judicial institutions and happiness. The effects of economic freedom remain robust to trust and institutional confidence controls and significant at 5 % and similarly stable and significant coefficients are confirmed for income and unemployment effects on happiness.

This confirms our earlier findings, suggesting that societies with greater market openness, greater rule of law, stronger protection of security of property rights, regulatory efficiency and more limited government tend to experience consistently higher levels of subjective well-being even after the possible effects of income, unemployment, institutional governance, inequality, public health, political freedom, civil and religious liberties, life satisfaction, extent of opportunities, crime and violence, social capital, trust and institutional confidence and emotional characteristics. Therefore, the evidence gives credence to the underlying hypothesis H1. In the next section, the robustness and sensitivity of the effects of economic freedom on cross-national happiness is examined.

5 Robustness Checks

5.1 Extreme Bounds Analysis

We assess the robustness of economic freedom and the set of conditioning variables and examine the significance of estimated effects when different exclusion restrictions are imposed on the empirical model. Such sensitivity analysis is carried out by extreme bounds analysis which has been applied extensively in the empirical literature (Leamer and Leonard 1983; Leamer 1983, 1985; Granger and Uhlig 1990; Levine and Renelt 1992; Fowles and Merva 1996; Sala-i-Martin 1995; Sturm et al. 2005; Reed 2009).

Extreme bound analysis (EBA) allows us to control for the potential happiness covariates identified by other studies, to provide evidence on the sensitivity of estimated effects to alternative model specifications and different sets of conditioning covariates and examine whether a set of covariates can robustly explain cross-country differences in subjective well-being. The EBA is carried out by the following sensitivity equation:

$$\hat{h}_{i,\tau} = C_{i,\tau}\hat{\mu}_1 + \mathbf{X}'_{i,\tau}\alpha + \mathbf{Z}'_{i,\tau}\gamma \tag{2}$$

where $\hat{h}$ is the level of happiness for country i and for the time period τ, C is the explanatory variable whose significance is to be tested, $\mathbf{X}$ is the vector of standard explanatory variables common across all empirical model specifications (GDP per capita, unemployment rate) and $\mathbf{Z}$ is the vector of additional explanatory variable which differs between specifications. Using EBA, regressions with all possible combinations of variables are performed. Upper extreme bound of each coefficient of interest is computed by taking the lowest regression estimate plus two standard deviations and minus two standard deviations from the lower extreme bound. Our 5 % rejection criterion follows Leamer (1985) and Levine and Renelt (1992) and suggests that if the lower extreme bound is negative while the upper extreme bound of the coefficient of interest is positive, the explanatory variable C is not robustly related to subjective well-being.

In Table 5, EBA estimates are presented for the effect of economic freedom and the entire set of 41 conditioning variables. The evidence confirms the significance of economic freedom with respect to cross-country subjective well-being and suggests that the index of economic freedom is robust to various alternations in the set of explanatory variables. EBA estimates further indicate the relevance of cross-country differences in income levels and unemployment rates in explaining happiness variance. Societies with greater longevity are significantly more likely to experience greater well-being levels whereas, according to our estimates, no such claim can be made for the effect of income inequality. Even though societies with better institutional quality are generally characterized by higher subjective well-being, EBA highlights considerable parameter heterogeneity.

Countries with better control of corruption, greater voice and accountability and absence of civil war achieve systematically higher well-being levels whereas the set of institutions such as the rule of law and quality of regulation seems to be inversely related to subjective well-being. A similar pattern can be observed with respect to political freedom covariates since our sensitivity analysis confirms the robustness of the ability to voice concern to public officials and insignificant effects of political rights and government type, advocating a rather limited role of political system in determining subjective well-being. Parameter heterogeneity is also observed for the civil and religious freedom variables. Although freedom of choice is not robustly related to subjective well-being, countries with state religion are significantly more likely to experience higher well-being.

Table 5 Extreme bound analysis for happiness covariates

Explanatory variable	βmin	βmax	95 % Confidence interval for βmin		95 % Confidence interval for βmax		Conclusion
			Lower bound	Upper bound	Lower bound	Upper bound	
Index of economic freedom	0.019**	0.073***	0.002	0.040	0.056	0.089	Significant
Baseline covariates							
GDP per capita	0.263***	0.728***	0.038	0.488	0.551	0.905	Significant
Unemployment rate	−0.029***	−0.019**	−0.045	−0.013	−0.035	−0.003	Significant
Additional covariates							
Gini coefficient	0.018**	0.027***	0.000	0.037	0.010	0.045	Significant
Life expectancy	0.046***	0.061***	0.021	0.070	0.035	0.086	Significant
Health expenditure	0.078*	0.194***	−0.001	0.158	0.108	0.281	Possible
Governance covariates							
Control of corruption	0.634**	0.677**	0.091	1.176	0.089	1.176	Significant
Government effectiveness	0.529	0.538	−0.163	1.222	−0.151	1.228	Insignificant
Political stability and absence of violence	−0.247*	−0.196	−0.509	0.015	−0.455	0.063	Possible
Regulatory quality	−0.865***	−0.590**	−1.581	−0.149	−1.134	−0.047	Significant
Rule of law	−0.898***	−0.473**	−1.519	−0.277	−1.268	−0.269	Significant
Voice and accountability	0.312**	0.356**	0.001	0.624	0.038	0.674	Significant
Civil War	−0.445**	−0.391**	−0.831	−0.061	−0.774	−0.008	Significant
Political freedom covariates							
Political rights	−0.097	−0.097	−0.242	0.056	−0.242	0.056	Insignificant
Expressed concern to a public official	0.029***	0.031***	0.013	0.046	0.014	0.048	Significant
Government type	0.037	0.037	−0.0088	0.0830	−0.0088	0.083	Insignificant
Civil and religious freedom covariates							
Freedom of choice	0.100	0.108	−0.028	0.229	−0.029	0.238	Insignificant
Tolerance of ethnic minorities	0.008*	0.017	−0.0009	0.017	−0.0028	0.024	Possible

Table 5 continued

Explanatory variable	βmin	βmax	95 % Confidence interval for βmin		95 % Confidence interval for βmax		Conclusion
			Lower bound	Upper bound	Lower bound	Upper bound	
Tolerance of immigrants	0.006	0.006	−0.0033	0.016	−0.0033	0.016	Insignificant
State religion	0.365**	0.803***	0.077	0.653	0.464	1.142	Significant
State religion × catholic	0.425	0.847***	−0.156	1.007	0.461	1.234	Possible
State religion × muslim	−0.787***	−0.426	−1.277	−0.296	−1.038	0.185	Possible
State Religion × orthodox	−1.060***	−0.401	−1.630	−0.491	−0.942	0.139	Possible
State religion × buddhist	−0.859*	−0.859*	−1.792	0.073	−1.792	0.073	Significant
State religion × hindu	−0.234	0.402	−1.398	0.375	−1.439	0.853	Insignificant
State religion × jewish	−0.655	0.987	−1.002	0.344	−0.988	1.711	Insignificant
Crime and violence covariates							
Feeling safe walking alone at night	0.013	0.015**	−0.003	0.030	0.001	0.029	Possible
Physical assault rate	−0.042***	0.019	−0.074	−0.01	−0.005	0.041	Possible
Satisfaction and opportunity covariates							
Living standard satisfaction	0.032***	0.032***	0.021	0.043	0.021	0.043	Significant
Health satisfaction	0.026***	0.031***	0.012	0.039	0.018	0.044	Significant
Does working hard get you ahead	0.015***	0.018***	0.005	0.024	0.008	0.029	Significant
Job opportunities	0.009**	0.009	0.001	0.016	0.001	0.016	Possible
Social capital covariates							
Marriage rate	−0.012***	0.012***	−0.022	−0.002	−0.022	−0.002	Significant
Volunteerism rate	0.018***	0.025***	0.004	0.032	0.012	0.037	Significant
Helping strangers	0.014***	0.016***	0.003	0.025	0.005	0.027	Significant
Family and friend support	0.015**	0.026***	0.001	0.029	0.012	0.040	Significant
Charity donations	0.009*	0.017***	−0.0004	0.019	0.008	0.026	Significant

Table 5 continued

Explanatory variable	βmin	βmax	95 % Confidence interval for βmin		95 % Confidence interval for βmax		Conclusion
			Lower bound	Upper bound	Lower bound	Upper bound	
Trust and confidence covariates							
General trust	0.009	0.009*	−0.002	0.020	−0.001	0.020	Possible
Confidence in judicial institutions	0.005	0.028***	−0.002	0.012	0.015	0.041	Possible
Confidence in financial institutions	−0.033***	−0.017***	−0.047	−0.019	−0.028	−0.005	Significant

Asterisks denote statistically significant extreme bounds of coefficients at 10 % (*), 5 % (**) and 1 % (***)

When extreme bound test is performed on interaction terms between dummy variables for state religion and major religious group, the evidence suggests that the significant positive effect of state religion emanates from Protestant countries with constitutionalized religion which include Norway, Sweden, Finland, Denmark and Iceland. In addition, the effect of Catholic, Muslim, Eastern Orthodox, Jewish and Hindu state religion on subjective well-being is fragile or insignificant whereas the effect of Buddhist state religion is negative. Equally fragile effects are confirmed for the effects of crime and violence covariates. The evidence further confirms the importance and relevance of life satisfaction, health satisfaction and opportunity covariates in explaining the differences behind varying levels of subjective well-being across countries. Extreme bound tests also suggests the pivotal significance of social capital endowment across countries with respect to subjective well-being levels. A robust link between subjective well-being and each of the five measures of social capital is confirmed whereas the association between subjective well-being, trust and institutional confidence is weak.

5.2 Institutional Endogeneity of Economic Freedom and the Validity of Instruments

The potential weakness of the obtained results is posited by the endogeneity of economic freedom where a significant fraction of the cross-country variance of economic freedom is not observed to the econometrician which could lead to omitted variable bias. When the variance of economic freedom across countries is partly unobserved, the exogeneity assumption for the effect of economic freedom on happiness is violated since $\text{cov}(EF, \varepsilon) \neq 0$. The solution to overcome omitted variable bias is to deploy relevant set of instruments (Z) for the level of economic freedom with non-zero correlation, $\text{cov}(Z, EF) = 0$ which should be exogenous to the error term in the structural happiness model or $\text{cov}(Z, \varepsilon) = 0$. Instrumental variables should exhibit the unobserved first-stage variation with respect to the level of economic freedom as potentially endogenous variable and exogeneity with respect to the subjective well-being.

To isolate the effects of economic freedom on subjective well-being, we exploit the cross-country variation national culture, captured by the measures of culture from Hofstede (2001), as an exogenous source of variance in national happiness. We assume that cultural differences affect the subjective well-being as the outcome of interest only through the level of economic institutions, as captured by the index of economic freedom. Five cultural variables are considered as instruments for the level of economic freedom to address potential omitted variable bias and reverse causality: (1) power distance index, (2) individualism versus collectivism, (3), uncertainty avoidance, (4) long-term versus short-term orientation, and (5) indulgence versus restraint.

First, power distance index is defined as the extent to which less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally. High power distance emphasizes greater extent and tolerance of the inequality in the distribution of political and economic power. Hence, societies where the acceptance of uneven distribution of power is embedded in the existing mindset, are significantly more likely to endure the set of extractive political and economic institutions since such a cultural setting is acceptable to political inequality, giving political elites greater incentives and opportunities to undertake rent-seeking and rent-extracting activities through less secure property rights, weak rule of law, protectionist trade and regulatory policies and political clientelism which is reflected by a lower index of economic freedom. Licht et al. (2007) provide further empirical evidence on the importance of the link between culture and the set of social institutions whereas Williamson and Mathers (2011) discuss the

complementarity between culture and economic freedom in particular. In this respect, the power distance index is a relevant instrument for the index of economic freedom. Since the power distance index affects the level of subjective well-being only through the index of economic freedom as an endogenous variable, the resulting correlation between power distance index and national happiness is spurious which ensures an exogenous source of variation in the outcome of interest.

Second, Individualism versus collectivism index denotes the degree of interdependence society maintains among its members. The extent of individualism has to do with whether people view themselves as "I" or "We". In collectivist societies, people belong to closed groups that take care of them in exchange for loyalty. In individualist societies, people dislike loyalty-based group formation and instead look for themselves and direct family only. Since individualist culture emphasizes the importance of individual freedom and personal choice over collective aims, such a cultural setting favors greater economic freedom. More individualistic societies are significantly more likely to prefer free trade over protectionist policies, open market over autarky and self-sufficiency. Moreover, individualist societies are considerably less likely to foster rent-seeking activities and rent-extracting activities since it is more difficult and costly to free ride at the expense of others, and are consequently more likely to foster stronger rule of law and better security of property rights. We assume the extent of individualism affects the national happiness only through the set of economic institutions to isolate the effects of economic freedom on subjective well-being.

Third, uncertainty avoidance deals with the way society deals with the fact that the future can be unknown and whether future should be controlled or just let it happen. Uncertainty avoidance is defined as the extent to which members of culture feel threatened by ambiguous or unknown situation and have created beliefs and institutions that try to avoid them. Societies with greater tendency of uncertainty avoidance view individuals as inherently weak show a great need for rules and extensive legal systems to structure individual life. However, the need of individuals to obey laws is weak. Therefore, societies with greater uncertainty avoidance are more susceptible to widespread corruption, extensive black market, and a deep division between the rules delegated legal system and the real enforcement of these rules. Hence, countries with greater uncertainty avoidance are substantially more likely to experience lower economic freedom.

Fourth, the normative versus pragmatic describes quantitatively how a society has to maintain some links with its own past while dealing with the challenges of the present and the future. In general, normative societies prefer to maintain time-honored customs, norms and traditions while viewing the future and societal change with significant suspicion. Pragmatic societies, which score high on this dimension, encourage thrift and efforts in modern education as a way to prepare for the future. Hence, more pragmatic societies should be more adaptable to changing economic institutions and should therefore experience higher levels of economic freedom as a result of more laudable view of the future compared to normative societies. At the same time, the degree of pragmatism affects the national happiness only through the set of existing economic institutions.

And fifth, indulgency versus restraint index is defined as the extent to which people try to control their desires and impulses, based on how they were raised. Indulgent culture can be characterized as a society with relatively weak control whereas restrained cultures possess relatively strong control of desires and impulses. Indulgent societies have a greater tendency and willingness to realize their impulses and desires and also possess greater optimism. Restrained societies have a tendency for cynicism and pessimism, do not put much emphasis on leisure and control the gratification of their desires. People with

restrained orientation perceive their actions as restrained by social norms and feel that indulgence is somewhat wrong. Furthermore, more indulgent societies are substantially more likely to disregard the importance of economic institutions and should therefore have a tendency towards lower economic freedom compared to more restrained societies.

In isolating the effects of economic freedom on subjective well-being, an exogenous relationship between each Hofstede cultural dimension instrument and the outcome of interest is assumed. Since each cultural instrument affects the national happiness only through the level of economic freedom, zero correlation between each proposed instrument and the error term in the structural equation is assumed. Exogeneity and relevance conditions permit the attempt to establish a causal mechanism between economic freedom and national happiness and by addressing the endogeneity of the latter and the subsequent omitted variable bias. Isolating the effects of economic freedom on subjective well-being is contingent on three underlying premises.

First, cross-country differences in cultural values, emphasized by Hofstede dimensions, are the relevant source of differences in the level of economic freedom. Second, power distance, individualism, uncertainty avoidance, short-term versus long-term orientation, and indulgence versus restraint indice are by no means directly related to underlying differences in subjective well-being across countries and are therefore not absorbed by the unobserved component in the structural happiness equation. And third, following earlier studies, we explicitly tackle the endogeneity of economic freedom by deploying Hofstede dimensions of culture as reasonably exogenous sources of variation in the subjective well-being as the outcome of interest.

Although a cross-country analysis of subjective well-being by Diener et al. (1995) suggests a close association between cultural characteristics and subjective well-being, such association may not be direct in the model with omitted variable bias and possible reverse causality but the relationship between culture and subjective well-being may be driven indirectly through the economic freedom mechanism. Hence, our approach exploits Hofstede cultural dimensions as exogenous source of cross-national happiness variance rather than as a direct confounder of national happiness.

We posit the reduced-form relationship for the level of economic freedom to tackle the potential source of endogeneity and to identify its effect on subjective well-being:

$$\begin{aligned} EF_{i,\tau} = \hat{\omega}_0 + \hat{\omega}_1 \cdot Z_{1i,\tau}^{PowerDistance} \hat{\omega}_2 \cdot Z_{2i,\tau}^{Individualism} + \hat{\omega}_3 \cdot Z_{3i,\tau}^{Uncertainty} \\ + \hat{\omega}_4 \cdot Z_{4i,\tau}^{Normative} + \hat{\omega}_5 \cdot Z_{5i,\tau}^{Indulgence} + \mathbf{X}'_{i,\tau}\boldsymbol{\beta} + \xi_i \end{aligned} \tag{3}$$

where $Z_{1i,\tau}^{PowerDistance}$ is the index of power distance, $Z_{2i,\tau}^{Individualism}$ is the index of individualism, $Z_{3i,\tau}^{Uncertainty}$ is the index of uncertainty avoidance, $Z_{4i,\tau}^{Normative}$ is the index of normative (short-term) versus pragmatic (long-term) orientation, $Z_{5i,\tau}^{Indulgence}$ is the index of indulgence versus restraint, $\mathbf{X}'$ is the vector of exogenous covariates from structural cross-country happiness Eq. (1) and ξ is the reduced-form stochastic disturbance.

The underlying assumption of reduced-form relationship for cross-country variation in the economic freedom in (2) is the validity of the exclusion restriction for the set of Hofstede cultural dimension instruments for the national happiness which allows us to exclude the direct relationship between the set of instruments and the subjective well-being (1) to isolate the effects of economic freedom on the outcome of interest and (2) to establish an exogenous source of cross-national happiness differences directly unrelated to the outcome of interest which suggests that any resultant relationship between cultural instrumental variables and the national happiness is spurious. Essentially, the exogeneity

assumption for the set of proposed cultural instruments for economic freedom advocates a zero direct correlation between the set of instruments and the error term in the structural equation: $\text{cov}\left(Z_{1i}^{PowerDistance}, \varepsilon\right) = 0$, $\text{cov}\left(Z_{2i}^{Individualism}, \varepsilon\right) = 0$, $\text{cov}\left(Z_{3i}^{Uncertainty}, \varepsilon\right) = 0$, $\text{cov}\left(Z_{4i}^{Normative}, \varepsilon\right) = 0$ and $\text{cov}\left(Z_{5i}^{Indulgence}, \varepsilon\right) = 0$, respectively.

In Fig. 4, the first-stage relationship between the economic freedom, as endogenous variable, and the set of Hofstede cultural dimensions is presented empirically. The first evidence suggests a strong and persistent cross-country relationship between the cultural environment and the index of economic freedom. Countries with greater power distance and more unequal distribution of power are significantly more likely to encounter lower economic freedom. On the other hand, more individualist societies are substantially more conducive to higher economic freedom than collectivist societies. The estimated unconditional regression coefficient is both substantial and statistically significant at 1 %. Moreover, cultural pragmatism and the strength impulse and desire control are significantly positively correlated with the index of economic freedom whereas the avoidance of uncertainty is slightly negatively associated with the index of economic freedom. Hence, the Hofstede cultural variable tend to matter a great deal in accounting for the differences in the index of economic freedom and tackling the potential endogeneity, omitted variables and the reverse causality.

In Table 6, instrumental variable (IV) estimates of structural happiness model specification are presented alongside first-stage OLS regressions for the index of economic freedom. Panel A exhibits structural model estimates whereas Panel B presents first-stage OLS regressions for the index of economic freedom with Hofstede cultural dimensions to account for the omitted variable bias. In column (1), the endogenous structural model specification is estimated with baseline covariates which comprise per capita income and unemployment rate. In the first stage, power distance index and uncertainty avoidance are significantly negatively related to the index of economic freedom which confirms our expectations on the relevance of Hofstede cultural dimensions in tackling the endogeneity of economic freedom. In the second stage, the estimated endogenous effect of economic freedom on national happiness is both large and statistically significant. In particular, our estimates imply that 10 % rise in the index of economic freedom would improve the national happiness index by 0.5 points respectively, holding the effect of income and unemployment constant.

In column (2), governance covariates are added to the set of exogenous covariates in the base model specification. The evidence largely confirms the robust relationship between the index of economic freedom and national happiness as well as the importance of income for national happiness once the endogeneity of economic freedom is addressed. In the first-stage, cultural variables are significantly associated with the cross-country differences in the index of economic freedom. In column (3), political freedom variables are added to the set of exogenous covariates in the underlying model specification. The evidence reaffirms both the size and significance of the coefficient on the effect of economic freedom on national happiness whereas the first-stage evidence offers additional support for the relevance of cultural dimensions in accounting for the omitted variable bias in a model without addressing for the endogeneity of economic freedom. In column (4), civil and religious freedom covariates are added to the vector of exogenous variables and the endogenous effect of economic freedom on national happiness remains basically intact.

In column (5), crime and violence control variables are added to the set of exogenous covariates and the evidence further advocates large, robust and significant contribution of economic freedom to the national happiness in addition to the importance of the income
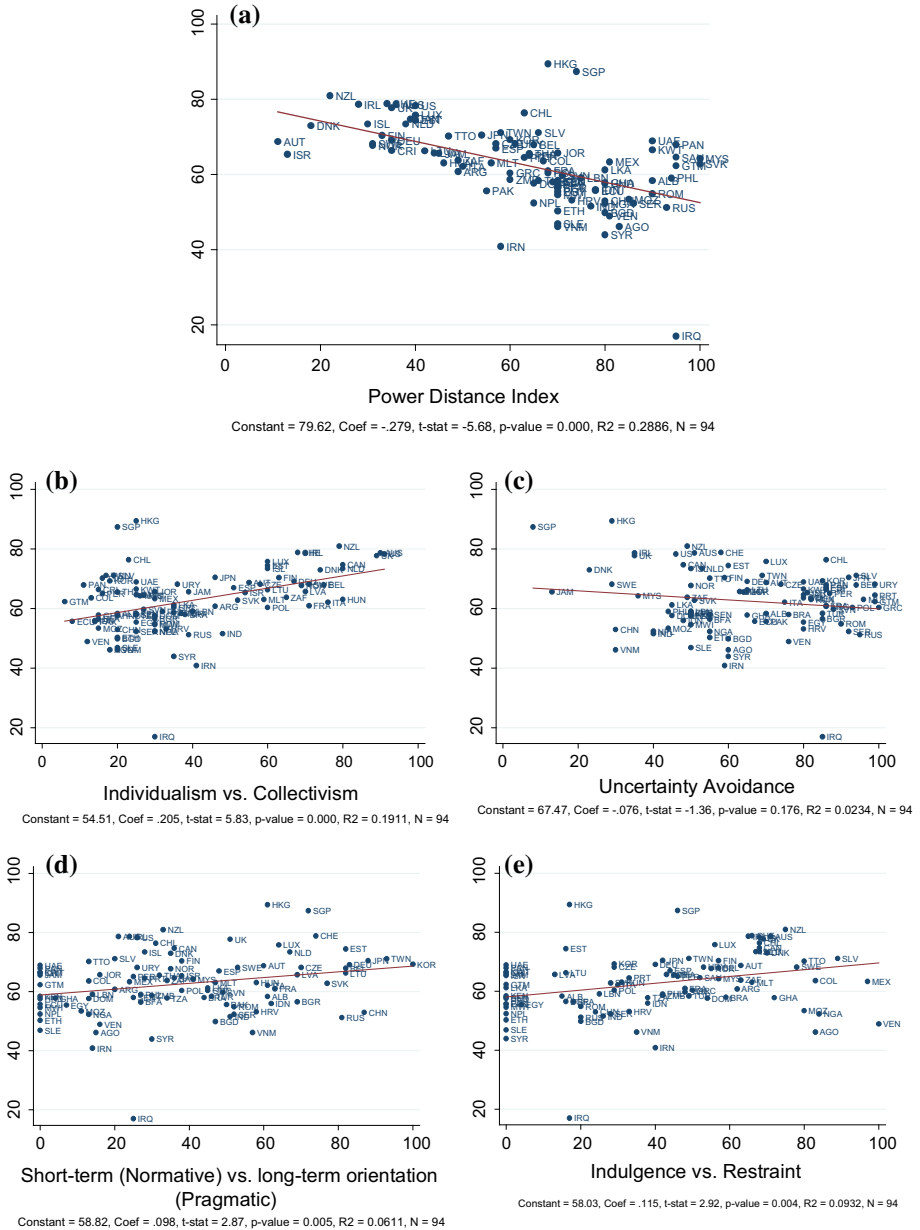
Fig. 4 Culture and economic freedom across countries. **a** Power distance index, **b** individualism versus collectivism, **c** Uncertainty Avoidance Index, **d** short-term versus long-term orientation, **e** indulgence versus restraint

level. Column (6) adds life satisfaction and opportunity covariates to the base model specification and the results confirm the robust association between economic freedom and national happiness even after controlling for the possible and independent effects of life satisfaction and locus of opportunities on happiness. In the first-stage, power distance index

Table 6 Controling for endogeneity of economic freedom—instrumental variable estimates of empirical happiness model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: endogenous (structural) specification								
Index of economic freedom	.051** (.021)	.131*** (.039)	.041** (.021)	.148*** (.049)	.074*** (.024)	.050* (.029)	.056* (.034)	.065** (.033)
Ln GDP per capita	.362** (.143)	.789*** (.172)	.412*** (.141)	.144 (.227)	.329** (.150)	.106 (.266)	.327* (.181)	.241 (.204)
Panel B: first-stage OLS regressions for index of economic freedom								
Power distance index	−.153*** (.047)	−.024 (.030)	−.076* (.040)	−.070 (.051)	−.146*** (.045)	−.144*** (.048)	−.125** (.056)	−.173*** (.060)
Individualism versus collectivism	−.073 (.045)	−.109*** (.033)	−.105** (.046)	−.033 (.056)	−.072 (.044)	−.028 (.046)	−.060 (.050)	−.046 (.049)
Uncertainty avoidance	−.111*** (.042)	−.044** (.023)	−.155*** (.044)		−.096** (.041)		−.072 (.050)	
Normative versus pragmatic		−.063*** (.017)		−.076** (.036)				
Indulgence versus restraint				.030 (.029)	.022 (.028)	.018 (.030)	.002 (.033)	
Observations	94	94	94	94	94	94	94	94
R2	0.5014	0.4436	0.5615	0.2517	0.4445	0.6264	0.5610	0.4579
Wald χ^2 test (Prob $> \chi^2$)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Angrist–Pischke multivariate robust F Test on excluded instruments (Prob > F)	0.000	0.000	0.001	0.072	0.002	0.023	0.188	0.021
Exogenous covariates								
Baseline covariates	Y	Y	Y	Y	Y	Y	Y	Y
Governance covariates		Y						
Political freedom covariates			Y					
Civil and religious freedom covariates				Y				
Crime and violence covariates					Y			
Satisfaction and opportunity covariates						Y		
Social capital covariates							Y	

Table 6 continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trust and confidence covariates								Y
Wu–Hausman robust endogenity test (Prob > F)	0.050	0.000	0.069	0.000	0.006	0.084	0.074	0.097
Hansen–Sargan test of overidentifying restrictions (Prob > χ^2)	0.557	0.175	0.380	0.717	0.227	0.855	0.355	0.442

The dependent variable is the 10-step numeral mean happiness level from Veenhoven (2013) based on World Happiness Database. Standard errors are adjusted for possible heteroskedasticity and serially correlated disturbances between countries using Huber–White variance matrix sandwich estimator. *Asterisks* denote statistically significant coefficients at 10 % (*), 5 % (**) and 1 % (***), respectively

accounts for the bulk of the cross-country variance in the index of economic freedom. In column (7), measures of social capital are added to the base model specification. In spite of the previously confirmed robust and persistent association between social capital and national happiness, our results confirm the robust contribution of economic freedom to the national happiness once social capital is controlled for and once the endogeneity of economic freedom is addressed. In column (8), trust and confidence covariates are added to the base sample specification. The evidence in the first stage suggests a strong and unequivocal relationship between power distance index and index of economic freedom, and imply that societies with the culture of more uneven distribution of power are substantially more likely to establish lower economic freedom.

The essential question underlying our results is whether the level of economic freedom is endogenously determined by the cultural environment, simultaneously captured by the Hofstede cultural dimensions. We subject the endogeneity of economic freedom to the formal test. If the endogeneity of economic freedom does not matter with respect to national happiness differences, instrumental variable estimator should yield inconsistent results, not significantly different from OLS estimates in Tables 2, 3 and 4. In each specification, the endogeneity of economic freedom is tested based on the endogeneity test (Wu 1973; Hausman 1978) where the distribution of error term from IV is assessed against the alternative error term distribution under OLS estimator. The evidence largely suggests a straightforward rejection of the null hypothesis at 5 % significance rate in four out of eight, and the rejection of the null at 10 % significance rate in each estimated specification which confirms our expectations about the endogeneity of economic freedom with respect to cross-country happiness differences.

Furthermore, the relevance of Hofstede cultural dimensions in accounting for the omitted variable bias in the relationship between national happiness and index of economic freedom is tested using an F Test on excluded instruments (Angrist and Pischke 2009). In each model specification, the assumption og weak identification of the endogenous variable is tested to check whether the proposed cultural dimensions weakly identify the effect of economic freedom on national happiness. The null hypothesis on the weakly identified relationship is rejected at 5 % significance rate in six out of eight specifications which confirms the relevance of Hofstede cultural dimensions in accounting for the omitted variables bias in the effect of economic freedom on national happiness.

The ultimate question concerns the validity of instruments in the identification of the effect of economic freedom on national happiness. A valid set of instruments should provide an exogenous source of variation in the national happiness that independently affects only the index of economic freedom but not the outcome of interest directly. In addition to the general discussion of instrument validity discussed in this sub-section, we also subject the validity of Hofstede cultural dimensions to the formal test of overidentifying restrictions, originally proposed by Hansen (1982) and Sargan (1988). The rejection of the null hypothesis of overidentification indicates that the proposed instruments for the potentially endogenous variable are invalid since the set of instruments are the appropriate source of omitted variables in the effect of endogenous variable on the outcome of interest. In Table 10, the null hypothesis of valid exclusion restriction is not rejected in each IV model specification, even at 15 % significance level. Valid exclusion restrictions imply that obtained results give further credibility to our discussion which emphasizes that Hofstede cultural dimensions are both an exogenous source of variation in the cross-country subjective well-being and a valid instrument to address the endogeneity of economic freedom. Hence, controlling and testing for possible sources of endogeneity via instrumental variables further yields the empirical support for the hypothesis H3.

5.3 Economic Freedom and Happiness Over Time: Panel Data Analysis

The final question about the robustness of our results to alternative estimation strategy and assumptions concerns the relationship between economic freedom and subjective well-being over time. The evidence so far is based on the cross-sectional pattern whereas such approach does not permit us to assess the impact of economic freedom on happiness over time and ignores the intertemporal dimension of subjective well-being since the former may have substantial distributional effects on the latter both within and across countries. This dimension may be central to the validity and robustness of our estimates.

We re-specify the cross-sectional model specification into the longitudinal model happiness model for the period 1996–2011 where the following specification takes place:

$$\hat{h}_{i,t} = \hat{\alpha}_0 + \hat{\alpha}_1 \hat{h}_{i,t-1} + \hat{\alpha}_2 \cdot EF_{i,t} + \hat{\alpha}_3 \cdot y_{i,t} + \eta_i + \eta_t + \varepsilon_{i,t} \tag{4}$$

where $\hat{h}$ is the mean happiness level for country i at time t, $\hat{h}_{i,t-1}$ is one-period lagged happiness level and the coefficient $\hat{\alpha}_1$ captures the possible happiness inertia and the effects of state dependence, EF is the index of economic freedom, y is per capita income, the parameter η_i represents country-fixed effects and captures unobserved heterogeneity in the distribution of dependent variable across countries, η_t captures unobserved time-specific effects, and ε is the error term which we allow to exhibit heteroskedastic distribution and serially correlation across space and time. Our primary coefficient of interest is $\hat{\alpha}_2$ since the main interest lies in investigating the sensitivity and robustness of the contribution of economic freedom to subjective well-being when both cross-sectional and intertemporal dimension are considered simultaneously. In Table 7, panel descriptive statistics for happiness, economic freedom and income level is presented. Compared to the cross-sectional analysis, the dispersion of each variable is decomposed into between-country and within-country source of variation. Descriptive evidence suggests that the largest share of variation in subjective well-being represents the variation between countries rather than within single countries over time which highlights both the importance and relevance of cross-country analysis. Similarly, between-country differences represents main source of variation in the index of economic freedom and income level.

Since the dispersion in the distribution of subjective well-being, economic freedom and income level mainly takes place between countries, the distributional pattern over time is a natural starting point for assessing the robustness of cross-sectional evidence. In Table 8, descriptive statistics for happiness variable is broken down across regions and presented for each country in the panel. Although cross-country variation in the mean level of happiness is markedly smaller than the differences in per capita income level, substantial differences in the level and dynamics of subjective well-being exist. The highest level of reported subjective well-being is found is Western Europe, United States and Latin America whereas the lowest observed level of happiness is found in Central European, East Asian and South Asian countries. Even within regions, marked differences in subjective well-being are a matter of fact. These differences are persistent both across space and time. In Western Europe, Denmark and Switzerland exhibit the highest level of reported subjective well-being, France, Austria and Germany are characterized by considerably lower well-being levels. Our descriptive evidence highlight substantially lower regional and country-specific happiness score whereas in countries with low well-being levels, such as Portugal, happiness level has worsened over time.

Descriptive evidence for Latin America suggests higher level of subjective well-being across space and time compared to Southern and Central Europe although the cross-

Table 7 Panel descriptive statistics for happiness, economic freedom and income level

	Obs	Mean	Overall SD	Between SD	Within SD	Min	Max
Average happiness	630	6.43	0.924	0.841	0.403	4.10	8.35
Index of economic freedom	630	64.62	8.547	8.024	3.176	37.10	82.60
GDP per capita	630	18.451	14.666	14.644	2.330	1.070	80.215

The table presents panel variable means and standard deviations between countries and within countries over time. The dependent variable is the 10-step numeral mean happiness level from Veenhoven (2013) based on World Happiness Database. The independent variables are index of economic freedom from *Heritage Foundation* and the level of real GDP per capita adjusted for purchasing power parity relative to the US dollar (Heston et al. 2012)

country dispersion in happiness score is substantially higher in comparison to European sub-samples, indicating a persistent heterogeneity and suggesting that not all Latin American countries can be considered identical with respect to the behavior of happiness over time. In East Asian sub-sample, higher happiness is associated with higher income level since Japan and South Korea are characterized by markedly higher level of reported subjective well-being than China. However, only South Korea experienced significant improvement in the level of subjective well-being over time, Japan experienced a slight happiness decline whereas the level of happiness in China failed to improve and did not deteriorate over time.

In spite of considerably lower level of subjective well-being than developed and higher income countries, India's level of happiness improved significantly over time whereas happiness deteriorated significantly in Egypt and Nigeria. Contrasting happiness trends across countries suggests that the context and rate of change in subjective well-being differs substantially across regions and countries. Since our cross-sectional evidence suggests that countries with higher level of economic freedom, on average experience higher level of subjective well-being even after possible correlates and determinants of happiness are controlled for, can rising or declining levels of economic freedom explain the cross-country happiness variance? This allows us to examine the robustness of the spatial relationship between economic freedom and happiness to the distributional and intertemporal dimension.

In Table 9, fixed-effects estimates of happiness model are presented. Each tested specification controls for unobserved (fixed) effects to avoid possible omitted variable bias and spurious state dependence. Two different sample compositions are considered: (1) base sample and (2) restricted sample which excludes individual countries from the base group to cross-check the stability of the estimated coefficient. Invoking the constructed model specification for panel data, first-order lagged dependent variable is common across all specifications and controls for possible state dependence and partial adjustment of contemporaneous happiness level to the past variation.

In column (1) and (2), base sample model specification is tested. In column (1), the effect of economic freedom on happiness is considered without income variable. Compared to the cross-sectional evidence, the estimated coefficient is negative and statistically significant at 10 %. It suggests that rising levels of economic freedom over time are associated with marginally lower levels of subjective well-being. If our empirical results imply a causal relationship, increasing the index of economic freedom by ten basis points would lead to 0.08 point reduction in happiness level, holding everything else constant after allowing for partial adjustment of subjective well-being to the previous level. In

Table 8 Regional breakdown of descriptive statistics for average happiness

	Mean	SD	Coefficient of variation	Trend	$P > |t|$
Western Europe and US	7.12	0.608	0.085	0.014**	0.099
Denmark	8.2	0.093	0.011	0.008	0.194
Switzerland	8.07	0.101	0.013	−0.017***	0.003
Netherlands	7.56	0.148	0.02	0.015**	0.031
Luxembourg	7.42	0.181	0.024	0.027***	0.001
Ireland	7.14	0.143	0.02	−0.003	0.677
Finland	7.08	0.246	0.035	0.043***	0.000
United Kingdom	7	0.154	0.022	0.027***	0.000
United States	6.87	0.188	0.027	−0.029***	0.001
Belgium	6.75	0.272	0.04	0.042***	0.005
Austria	6.71	0.143	0.021	−0.025***	0.002
Germany	6.38	0.246	0.039	0.038	0.007
France	6.26	0.236	0.038	0.042***	0.000
Central Europe	5.29	0.324	0.061	0.014	0.826
Poland	5.47	0.298	0.054	0.063***	0.000
Hungary	5.1	0.232	0.045	−0.035***	0.005
Southern Europe	5.96	0.669	0.112	−0.013	0.366
Israel	7.02	0.149	0.021	0.028***	0.000
Spain	6.46	0.28	0.043	0.009	0.623
Italy	6.01	0.23	0.038	−0.028	0.027
Croatia	5.66	0.109	0.019	−0.0002	0.974
Greece	5.43	0.362	0.067	−0.027	0.272
Portugal	5.23	0.316	0.06	−0.062***	0.000
Latin America	6.62	0.785	0.118	0.039***	0.003
Venezuela	7.5	0.335	0.045	0.065***	0.000
Colombia	7.28	0.402	0.055	−0.002	0.974
Argentina	7.22	0.278	0.039	0.060***	0.000
El Salvador	6.92	0.427	0.062	−0.026	0.22
Guatemala	6.92	0.707	0.102	0.058**	0.039
Honduras	6.92	0.709	0.102	0.017	0.472
Paraguay	6.81	0.604	0.089	−0.048	0.262
Mexico	6.78	0.19	0.028	0.01	0.405
Nicaragua	6.68	0.812	0.122	0.005	0.865
Uruguay	6.66	0.478	0.072	0.013	0.653
Chile	6.57	0.424	0.065	−0.001	0.955
Brazil	6.36	0.328	0.052	0.066***	0.000
Ecuador	6.36	0.591	0.093	0.063**	0.027
Panama	6.24	0.376	0.06	0.069***	0.000
Peru	5.68	0.584	0.103	0.085***	0.006
Dominican Republic	5	0.693	0.139	0.115***	0.007
East Asia	5.44	0.660	0.121	0.043	0.559
Japan	5.89	0.231	0.039	−0.026*	0.063
South Korea	5.41	0.925	0.171	0.168***	0.000

Table 8 continued

	Mean	SD	Coefficient of variation	Trend	$P > |t|$
China	5.04	0.27	0.054	−0.01	0.295
South Asia	5.06	0.532	0.105	0.070**	0.027
India	5.06	0.532	0.105	0.070**	0.027
Middle East and North Africa	5.65	0.727	0.129	−0.145***	0.000
Egypt	5.65	0.727	0.129	−0.145***	0.000
Sub-Saharan Africa	5.44	0.362	0.066	−0.051***	0.000
Nigeria	5.44	0.362	0.066	−0.051***	0.000

Table presents means and standard deviation of happiness score between countries and within countries over time. The standard error of estimated country-specific trend coefficient is adjusted for possible heteroskedasticity and serially correlated disturbances over time. *Asterisks* denote statistically significant trend coefficient at 10 % (***), 5 % (**) and 1 % (*), respectively

column (2), the income level variable is added to the model. The evidence highlights the importance and relevance of income in determining subjective well-being level across countries since the estimated coefficient is highly significant and its magnitude is similar to the estimated cross-sectional model. In particular, holding everything else constant, increase per capita income by 10 % would lead to 0.05 point happiness level rise over time. A robust relationship between happiness and income level across countries runs contrary to the famous Easterlin paradox and does not suggest a breaking point beyond which additional income gains would not improve subjective well-being. When economic freedom and income per capita co-determine the extent of subjective well-being, the estimated effect of economic freedom is larger than in the model without income and significant at 5 %. Higher levels of economic freedom over time are particularly associated with declining levels of subjective well-being. As the evidence from column (2) suggests, improving the index of economic freedom by 10 basis points would, ceteris paribus, lead to 0.1 point decline in mean happiness score, holding lagged effects and income effect constant.

Whereas countries with higher levels of economic freedom are significantly more likely to enjoy higher levels of subjective well-being at a certain point in time, rising levels of economic freedom are associated with decreasing happiness score. In the next step, we examine whether the negative effect of economic freedom over time is sensitive to alternative sample composition. To this end, each specification excludes individual countries from base group based on the population size and its share in the sample. Such restriction on the sample size allows us to examine the stability and further sensitivity of the estimated effects to different sample composition and size. In column (3), European countries are excluded from the sample whilst the baseline results remain unchanged. The estimated effect of economic freedom gains in its magnitude and remains significant at 1 %. In column (4), United States is excluded from the sample which does not alter the results.

The contribution of income and economic freedom to subjective well-being over time is stable since the former tends to improve subjective well-being whereas the latter is associated with a slight deterioration of happiness across countries over time. In column

Table 9 Fixed-effects estimated panel data happiness model specification

	(1) Base sample	(2)	(3) Excluding Europe	(4) Excluding US	(5) Excluding China and India	(6) Excluding Brazil and Mexico	(7) Excluding Nigeria	(8) Excluding Japan
Happiness ($t-1$)	.501*** (.087)	.459*** (.093)	.437*** (.104)	.458*** (.094)	.434*** (.099)	.456*** (.094)	.446*** (.098)	.459*** (.094)
Index of economic freedom	−.008* (.004)	−.010** (.004)	−.015*** (.005)	−.010** (.004)	−.012*** (.004)	−.010** (.004)	−.012** (.004)	−.011** (.004)
Log GDP per capita		.536** (.255)	.542 (.362)	.543** (.257)	.723** (.313)	.517** (.254)	.635*** (.279)	.540** (.256)
# Observations	588	588	322	574	560	560	574	574
# Clusters	42	42	23	41	40	40	41	41
F Test (Prob > F)	20.92 (0.000)	23.14 (0.000)	19.11 (0.000)	22.92 (0.000)	24.96 (0.000)	21.44 (0.000)	26.22 (0.000)	23.33 (0.000)
Within R^2	0.2464	0.2693	0.2591	0.2694	0.2661	0.2629	0.2785	0.2716
Between R^2	0.9774	0.5730	0.5136	0.5666	0.3819	0.5855	0.4890	0.5852
Overall R^2	0.7886	0.5142	0.4340	0.5089	0.3511	0.5240	0.4462	0.5243
Country-FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F Test on joint significance of FE (Prob > F)	16.19 (0.000)	12.60 (0.000)	10.41 (0.000)	12.55 (0.000)	12.18 (0.000)	12.49 (0.000)	10.41 (0.000)	12.30 (0.000)

The table presents fixed-effects (FE) estimates of longitudinal happiness model specification with the index of economic freedom and the level of GDP per capita in different population-adjusted sub-samples. Standard errors are adjusted into clusters to allow for arbitrary heteroskedastic distribution of error variance and serially correlated disturbances across and within countries over time. *Asterisks* denote statistically significant coefficients at 10 % (*), 5 % (**) and 1 % (***), respectively

(5), China and India are excluded from the base sample to reexamine the directional relationship between economic freedom and subjective well-being and the evidence does not alter baseline outcome. Furthermore, in column (6), Brazil and Mexico are excluded from the base sample as the two largest countries in Latin America. The evidence highlights the robustness of the negative directional effect of economic freedom on happiness and the positive contribution of income. In column (7) and (8), where Nigeria and Japan are excluded subsets from the base sample, the estimated effects remain intact and robust to different sample composition. Whereas economic freedom and income level explain between 40 and 50 % of the total variance in subjective well-being, both of them account for roughly one quarter of within-country happiness variance and 50 % of between-country variance. Each specification also tests the significance of unobserved happiness heterogeneity, captured by country-fixed effects. The significance of fixed effects is confirmed in each specification which further suggests that countries differ both significantly and persistently from one another in the level and behavior of happiness over time and should be considered identical. Evidence based on the panel data advocates a slightly negative relationship between economic freedom and happiness over time after controlling for possible spatial heterogeneity and income effects and giving the empirical support to reject the null hypothesis H2.

A final caveat regarding our cross-country panel-data model of happiness with temporal and spatial unobserved effects concerns the robustness of the linear panel data estimates from Table 9. The estimated model specification in Table 9 hinges on the assumption that unobserved effects are not correlated with lagged dependent variables which provides the consistency of standard errors and parameter estimates. Arellano and Bond (1991) showed that lagged dependent variables are correlated with the unobserved effects which biases the underlying coefficients renders the standard errors inconsistent, and proposed a dynamic panel data estimator based on first-differencing to remove the unobserved spatial effects and using the underlying instruments to form the moment conditions. This strategy allows for the non-zero correlation between lagged dependent variable and unobserved country-specific effects to disappear and provide the consistent standard errors and, hence, the underlying parameter estimates.

We address the non-zero spatial and temporal correlation between lagged happiness scores and unobserved effects to assess the robustness of the baseline panel data regression estimates by constructing the Arellano–Bond cross-country dynamic panel data happiness model based on 42 countries for the period 1996–2010:

$$\hat{h}_{i,t} = \sum_{j=1}^{p} \hat{\beta}_j \cdot \hat{h}_{i,t-j} + \hat{\gamma}_1 \cdot EF_{i,t} + \hat{\gamma}_2 \cdot \ln y_{i,t} + \eta_i + \eta_t + \varepsilon_{i,t} \tag{5}$$

where $\hat{\beta}_j$ denotes the effect of lagged happiness score on the average national happiness up to $j = 1, 2 \ldots p$ lag of the dependent variable, capturing the temporal state dependence in the mean happiness. Our primary interest lies in the coefficient $\hat{\gamma}_1$ which denotes the contribution of economic freedom (EF) to the national happiness after controlling for the effects of state dependence, income and possible unobserved effects across space (η_i) and time (η_t) which disappear from the model using the first-difference transformation of the lagged dependent variable, index of economic freedom and log per capita GDP. The term $\varepsilon_{i,t}$ denotes the stochastic component of cross-country happiness variance which we allow

Table 10 Arellano–Bond estimated panel data happiness model specification

	(1) Base sample	(2)	(3) Excluding France and Germany	(4) Excluding US	(5) Excluding China and India	(6) Excluding Brazil and Mexico	(7) Excluding Nigeria	(8) Excluding Japan
Happiness (t − 1)	.179* (.111)	.092 (.092)	.150* (.090)	.095 (.092)	.082 (.093)	.097 (.093)	.115 (.097)	.076 (.090)
Index of economic freedom	−.026* (.015)	−.028* (.016)	−.022 (.014)	−.029* (.016)	−.029* (.017)	−.029* (.016)	−.030** (.016)	−.030* (.017)
Log GDP per capita		1.489* (.815)	1.322* (.755)	1.482* (.819)	2.169** (.978)	1.476* (.826)	1.586* (.857)	1.548* (.829)
# Observations	420	420	400	410	400	400	410	410
# Clusters	42	42	40	41	40	40	41	41
# Instruments	97	98	98	98	98	98	98	98
Wald test (Prob > χ)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Time-fixed effects (Prob > F)	Yes (0.055)	Yes (0.178)	Yes (0.315)	Yes (0.189)	Yes (0.305)	Yes (0.244)	Yes (0.157)	Yes (0.190)
F Test on joint significance of lagged effects (Prob > F)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

The table presents Arellano–Bond estimates of longitudinal happiness model specification with the index of economic freedom and the level of GDP per capita in different population-adjusted sub-samples. Standard errors are adjusted into clusters to allow for arbitrary heteroskedastic distribution of error variance and serially correlated disturbances within countries over time. The effects of lagged dependent variable estimated up to the fourth lag are estimated but not reported. *Asterisks* denote statistically significant coefficients at 10 % (*), 5 % (**) and 1 % (***), respectively

to exhibit serially correlated disturbances and heteroskedastic distribution of error variance. We consider the effect of lagged happiness values on the contemporaneous national happiness up to fourth ($p = 4$) lag to capture the possible persistence of state dependence and provide the check on the choice of the first lag in the base panel data model specification. This kind of model re-specification allows us to examine the robustness check on the baseline longitudinal cross-country panel estimates and provide the sensitivity analysis to the base sample estimates given the non-zero correlation between lagged dependent variable and heterogeneity bias.

In Table 10, Arellano–Bond estimated panel data cross-national happiness model specification is presented using the identical sub-sample structure aside from the base sample. The estimated contribution of economic freedom remains robust to switching the panel data estimation strategy from a linear dynamic panel data to Arellano–Bond estimator by taking into account the non-zero correlation between lagged dependent variable and unobserved spatial effects. The estimated effect of the index of economic freedom on average national happiness is both persistent and significant at 10 % in alternative sub-samples. Increasing the index of economic freedom by ten percentage points over time would accordingly decrease the average national happiness score between 0.26 and 0.30 base points after controlling for possible income effects across columns (1) through (8). In column (3), the excluded sub-sample has been replaced by the largest European countries in terms of population size (France and Germany) to provide a singular covariance matrix. In addition, the persistence of time-specific effects disappears once the first-differencing removes the unobserved country-specific effects and further suggests the importance of economic freedom and income in influencing the national happiness. The results presented in Table 10 confirm the robustness of the base sample estimates from Table 9 and suggest that continuous rise in the index of economic freedom over time is significantly related to the decline of subjective well-being at the national level even after possible time-specific effects, state dependence and income effects are controlled for.

6 Conclusion

Although the empirical evidence so far suggests that higher level of economic freedom is one of the proximate causes of economic growth and prosperity, the evidence on the link between economic freedom and subjective well-being remains less clear. In this paper, we attempt to establish the institutional origins of subjective well-being and examine the impact of economic freedom on subjective well-being for 138 countries in the period 1996–2010 using the 10-step numeral happiness score from *World Database of Happiness* (Veenhoven 2013). As an indicator of subjective well-being, happiness is measured on the basis of the proto-question "Taken all things together on the scale from one to ten, how happy would you say you are?" inferred from the general surveys among adult working-age population. Higher values on the scale indicate greater subjective well-being and appreciation of life as a whole whereas lower reported score corresponds to the lesser observed subjective well-being. We exploit the cross-country variation in the aggregate index of economic freedom from *Heritage Foundation* to consistently estimate the effect of economic freedom on subjective well-being.

Our evidence based on the empirical cross-country happiness model suggests that countries with higher level of economic freedom experience consistently higher level of subjective well-being. In our preferred specification, the increase in the index of economic freedom by ten basis points leads to 0.15 point rise in the happiness-based level of subjective well-being. The positive effect of economic freedom on subjective well-being remains robust after we control for a broad array of established correlates and potential causes of happiness such as unemployment rate, income inequality, public health, civil and religious freedom, political freedom, crime and violence, life satisfaction and social capital. Our results also suggest that the effect of economic freedom on national happiness can be considered independently of alternative indicators of institutional quality such as the rule of law and control of corruption even though both sets of measures are correlated with economic freedom. Our EBA reveals the importance and relevance of economic freedom with respect to subjective well-being and confirms the significance of income, unemployment, income inequality, public health, civil and religious freedom, rule of law, control of corruption, voice and accountability, social capital and life satisfaction in determining cross-country happiness level whereas the effect of political freedom on subjective well-being is fragile.

We address the potential endogeneity of economic freedom and exploit cross-country differences in five Hofstede cultural dimensions as exogenous sources of variation to tackle omitted variable bias and identify the effect of economic freedom on subjective well-being. The evidence highlights the endogeneity of economic freedom and confirms its significance with respect to cross-country happiness differences. The endogenous effect remains robust to additional control variables, obtained exclusion restrictions and alternative specifications. The robustness and sensitivity of the estimated effect is further examined using panel data analysis of the relationship between economic freedom and happiness over time where we control for the unobserved cross-country heterogeneity. Even though higher level of economic freedom is associated with greater happiness across space, longitudinal evidence uncovers persistent and significant negative effect of rising economic freedom on national happiness over time after possible income effects and state dependence are controlled for. Our results cast an optimistic view on the potential of economic freedom to improve subjective well-being but also suggest that over time more economic freedom can exert a negative effect on happiness across countries. Future research should further address the longitudinal dimension of happiness-economic freedom relationship and perhaps examine whether the directional effect of economic freedom differs between its components and alternative measures.

Appendix

See Tables 11 and 12.

Table 11 Data and variables

Variable	Abbreviation	Variable description	Source
Dependent variable			
Average happiness	Happiness	Subjective appreciation of a life as a whole, as assessed in survey studies among the general population. Happiness level measured on 10-step numeral scale from zero (very unhappy) to 10 (very happy) based on the survey question: »Taking things together on the scale from zero to ten, how happy would you say you are?«	Veenhoven (2013)
Structural explanatory variables			
Index of economic freedom	EF	The degree to which country-specific policies and institutions support (1) open markets, (2) limited government, (3) rule of law and (4) regulatory efficiency	Heritage foundation
Real GDP per capita	GDP	The sum of gross value-added by resident producers in the economy plus any product taxes and minus any subsidies not included in the value of goods and services. GDP per capita is converted to 2005 constant prices and Geary-Khamis international dollar using purchasing power parity rates relative to US dollar	Penn world Tables 7.1 (Heston et al. 2012)
Gini coefficient	Gini	The extent to which the distribution of income among individuals in the economy deviates from a perfectly equal distribution. The Gini coefficient of 0 represents perfect equality while a coefficient of 100 implies absolute inequality	World bank
Life expectancy at birth (years)	Life	Number of years a newborn infant would life if prevailing patterns of mortality at the time of birth were unchanged throughout its life	World bank
Unemployment rate (%)	Unemployment	The share of labor force without work but available for and seeking employment	International labor organization
Health expenditure (% GDP)	Healthexp	Sum of public and private health expenditure divided by GDP. The expenditure covers the provision of preventive and curative health services, family planning activities, nutrition activities, and health-related emergency aid but excludes water and sanitation provision.	World bank
Governance covariates			
Control of corruption (from −2.5 to 2.5)	Corrupt	Composite indicator capturing perceptions of the extent to which public power is exercised for private gain, including petty and grand forms of corruption as well as capture of the states by elites and private interests	Worldwide governance indicators

Table 11 continued

Variable	Abbreviation	Variable description	Source
Government effectiveness (from −2.5 to 2.5)	Goveff	Composite indicator capturing perception of the quality of public services, quality of civil service and the degree of independence from political pressures, the quality of policy formulation and implementation and credibility of the government's commitment to such policies	Worldwide governance indicators
Political stability and absence of violence (from −2.5 to 2.5)	Stability	Composite indicator capturing perceptions of likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism	Worldwide governance indicators
Regulatory quality (from −2.5 to 2.5)	Regulatory	Composite indicator capturing perceptions of the ability of government to formulate and implement sound policies and regulations that permit and promote private sector development	Worldwide governance indicators
Rule of law (from −2.5 to 2.5)	Rule law	Composite indicator capturing perceptions of the extent to which agents have confidence and abide by the rules of the society, quality of contract enforcement, property rights, the police, the courts, as well as the likelihood of crime and violence	Worldwide governance indicators
Voice and accountability (from −2.5 to 2.5)	Voice	Composite indicator capturing the perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association and the media	Worldwide governance indicators
Civil War	War	Dummy variable for civil war	Uppsala conflict data program, conflict encyclopedia
Political freedom covariates			
Political rights (from 1 to 7)	Political	Ability to participate in political processes such as voting and legitimate elections, joining parties, running for office, etc. This variable captures elements relating to the electoral process, political pluralism and participation as well as the functionality of the government and additional discretionary political rights	Freedom house
Voiced concern to a public official (% of respondents)	Concern	Survey question: »Have you voiced a concern to a public official in the past month?«	Gallup World Poll

Table 11 continued

Variable	Abbreviation	Variable description	Source
Government type (from −10 to 10)	Democracy	The extent to which a society is democratic or autocratic based on the categorical rating where higher values indicate greater extent of political democracy. The extent of democracy/autocracy depends on competitiveness of executive recruitment, constraints on chief executives, regulation and competitiveness of executive recruitment.	Polity IV project, Marshall et al. (2012)
Civil and religious freedom covariates			
Civil liberties (from 1 to 7)	Civil	Freedom of expression and belief, associational and organizational rights, rule of law and political autonomy. Ordinal rating where higher values indicate greater extent of civil liberties	Freedom house
Tolerance of minorites (% agree)	Minorites	Survey question: »Is the city or area where you live good place or not a good place for racial and ethnic minorities?«	Gallup World Poll
Tolerance of immigrants (% agree)	Immigrants	Survey question: »Is the city or area where you live a good place or not a good place to live for immigrants?«	Gallup World Poll
State religion	Religion	Dummy variable for established state religion	Barro and McCleary (2005)
Crime and violence covariates			
Feeling safe walking alone at night (%)	Safety	Survey question: »Do you feel safe walking alone at nights in the city or area where you live?«	Gallup World Poll
Physical assault rate (%)	Assault	Survey question: »Within the past 12 months, have you been assaulted or mugged?«	Gallup World Poll
Social capital covariates			
Marriage rate (%)	Marriage	Survey question: »What is your current marital status?« Percentage of respondents who are married	Gallup World Poll
Formal volunteering (%)	Volunteerism	Survey question: »Have you volunteered your time to an organization in the past month?«	Gallup World Poll
Helping strangers (%)	Help	Survey question: »Have you helped a stranger or someone you didn't know who needed help in the past month?«	Gallup World Poll
Perception of family and friends' support (%)	Network	Survey question: »If you were in trouble, do you have relatives and friends you can count on to help you whenever you need them, or not?«	Gallup World Poll
Charity donations (%)	Donations	Survey question: »Have you donated money to a charity in the past month?«	Gallup World Poll
Trust and confidence covariates			
General trust (%)	Trust	Survey question: »Generally speaking, would you say that most people can be trusted or that you have to be careful in dealing with people?« Percentage of respondents agreeing that most people can be trusted	Gallup World Poll

Table 11 continued

Variable	Abbreviation	Variable description	Source
Confidence in judicial institutions (%)	Judicial	Survey question: »Do you have confidence in the judicial system and courts?«	Gallup World Poll
Confidence in banks and financial institutions (%)	Banks	Survey question: »Do you have confidence in financial institutions or banks?«	Gallup World Poll
Satisfaction and opportunity covariates			
Living standard satisfaction (%)	Lifesatis	Survey question: »Are you satisfied or dissatisfied with your living standard, all the things you can buy and do?«	Gallup World Poll
Health satisfaction rate (%)	Healthsatis	Survey question: »Are you satisfied or dissatisfied with your personal health?«	Gallup World Poll
Does working hard get you ahead (%)	Hardwork	Survey question: »Can people get ahead in this country by working hard, or not?« Percentage of respondents agreeing that people can get ahead by working hard	Gallup World Poll
Perceived job availibility (%)	Jobs	Survey question: »Thinking about job situation in the city or area you live today, would you say that now is a good time or bad time to find a job?« Percentage of respondents saying it's a good time to find a job	Gallup World Poll
Full-time employment (%)	Fulltime	Survey question: »What is your employment status?« Percentage of respondents with full-time employment	Gallup World Poll

Table 12 Sample size, regional composition and country abbreviations

Western Europe, Central Europe and North America

Australia	AUS	Denmark	DNK	Iceland	ISL	Norway	NOR	Switzerland	CHE
Austria	AUT	Estonia	EST	Ireland	IRL	Poland	POL	UK	UK
Belgium	BEL	Finland	FIN	Italy	ITA	Portugal	PRT	US	US
Canada	CAN	France	FRA	Luxembourg	LUX	Slovakia	SVK		
Croatia	HRV	Germany	DEU	Malta	MLT	Slovenia	SVN		
Cyprus	CYP	Greece	GRC	Netherlands	NLD	Spain	ESP		
Czech Rep	CZE	Hungary	HUN	New Zealand	NZL	Sweden	SWE		

Eastern Europe and Central Asia

Albania	ALB	Bulgaria	BGR	Lithuania	LTU	Romania	ROM	Uzbekistan	UZB
Armenia	ARM	Georgia	GEO	Macedonia	MKD	Russia	RUS		
Azerbaijan	AZE	Kazakhstan	KAZ	Moldova	MDA	Serbia	SER		
Belarus	BLR	Kyrgyzstan	KGZ	Mongolia	MNG	Turkey	TUR		
Bosnia	BIH	Latvia	LAT	Montenegro	MNE	Ukraine	UKR		

East Asia and Pacific

Cambodia	KHM	Indonesia	IDN	Malaysia	MYS	Singapore	SGP	Thailand	THA
China	CHN	Japan	JPN	Mongolia	MNG	South Korea	KOR		
Hong Kong	HKG	Laos	LAO	Philippines	PHL	Taiwan	TWN		

Latin America and Caribbean

Argentina	ARG	Colombia	COL	Guatemala	GTM	Nicaragua	NIC	Uruguay	URY
Belize	BLZ	Costa Rica	CRI	Haiti	HTI	Panama	PAN	Venezuela	VEN
Bolivia	BOL	Dominican Rep.	DOM	Honduras	HND	Paraguay	PRY		
Brazil	BRA	Ecuador	ECU	Jamaica	JAM	Peru	PER		
Chile	CHL	El Salvador	SLV	Mexico	MEX	Trinidad-Tobago	TTO		

Middle East and North Africa

| Algeria | DZA | Iraq | IRQ | Lebanon | LBN | Syria | SYR | Yemen | YEM |
| Djibouti | DJI | Jordan | JOR | Morocco | MAR | Tunisia | TUN | | |

Table 12 continued

Egypt	EGY	Kuwait	KWT	Saudi Arabia	SAU	United Arab Em.	UAE	
South Asia								
Afghanistan	AFG	India	IND	Nepal	NPL	Pakistan	PAK	Sri Lanka	LKA
Bangladesh	BGD							
Sub-Saharan Africa								
Angola	AGO	Central Af. Rep.	CAF	Kenya	KEN	Namibia	NAM	Sudan	SDN
Benin	BEN	Chad	TCD	Liberia	LBR	Niger	NER	Tanzania	TZA
Botswana	BWA	Cote d'Ivoire	CIV	Malawi	MWI	Nigeria	NGA	Togo	TGO
Burkina Faso	BFA	DR Congo	ZAR	Mali	MLI	Rep. Congo	COG	Uganda	UGA
Burundi	BDI	Ghana	GHA	Mauritania	MRT	Rwanda	RWA	Zambia	ZMB
Cameroon	CMR	Guinea	GIN	Mozambique	MOZ	South Africa	ZAF	Zimbabwe	ZWE

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