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**International Center for Public Policy
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Satisfaction**

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**October
2021**

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International Center for Public Policy Andrew Young School of Policy Studies

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Fiscal Policies, Decentralization, and Life Satisfaction

Manuela Ortega Gil*

October 2021

Abstract

This paper studies the relationship between wellbeing and governments' fiscal policies across the world, including government decentralization, over the period between 1999 and 2018. In contrast to the previous literature on wellbeing, the current paper investigates four forms of life satisfaction (SL) as the dependent variable and tries to answer whether different types of public spending program, different types of taxes and the level of fiscal decentralization influence wellbeing as measured by life satisfaction. The analysis uses survey data from two sources of life satisfaction variables: The World Values Survey and the European Values Survey, both of which use a ten-level SL scale. I treat these satisfaction values in four ways, resulting in four robust models (two logit models, one Ordinary Least Squares model and one stereotype logistic model). The same control variables and fixed effects are used in all models. The results indicate that personal individual taxes, labor taxation (income and payroll taxes), indirect taxes on goods and expenditures on environmental protection and education have a significant and positive effect on life satisfaction in all four models. Likewise in all four models, taxes on property and expenditures on health and culture are significant and negative. Furthermore, while increased decentralization (in the form of greater vertical fiscal imbalance and expenditure decentralization) improves the likelihood of having a life satisfaction greater than six (of ten), the effect of transfers to subnational governments' own revenue is significant and negative in all models.

Keywords: Life Satisfaction; Fiscal Policies; Decentralization; Wellbeing

JEL classification: H70, I30

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1. Introduction

Beginning in the late 19th century, it became evident that the level of economic growth and surplus goods and services, even in developed countries, did not match the subjective wellbeing of its citizens. This led to the "Easterlin Paradox," which holds that there is, in fact, *no* link between the level of economic development of a country and the general happiness of its citizens (Easterlin, 1974; Inglehart, 1996; Clair, 1999; Easterbrook, 2003; Stevenson & Wolfers, 2008; Forgeard et al., 2011). Likewise, Layard (2003: 17) asserts that "once a country has over \$15,000 per head, its level of happiness appears to be independent of its income per head." Naturally, such bold pronouncements have inspired many to try to empirically examine the relationship of development and wellbeing.

An increasing number of economists have sought indicators of national health aside from the traditional gross domestic product (GDP) that instead may better reflect individual wellbeing, as well as the individual preferences and requirements that can lead to improved wellbeing. The research on wellbeing has grown in prominence in the scientific literature since late 20th century, and governments have become increasingly interested in assessing the wellbeing of their citizens, often by using polls (Benjamin et al., 2014). This growth in research into wellbeing and happiness has been furthered since the 1980s by the creation of international organizations that poll wide populations for wellbeing indicators. Most notably, the World Values Survey (WVS) was established in 1981 to poll residents of many nations for their responses to the transformations caused by economic and technological developments on motivations and basic values in developed countries. This poll includes indicators for wellbeing, such as feelings of happiness and satisfaction with your life (SL). Similarly, from 2013, the OECD has published a Better Life Index among its databases. This index reflects not only wealth but also other variables related to the wellbeing of citizens, including a total of 11 dimensions the OECD considers essential to measuring the quality

of life. These dimensions are composed of 24 indicators, including five subjective indicators, one of which is life satisfaction.

Research linking wellbeing with key aspects of sustainable development has also increased in prominence in recent decades. The increased awareness of wellbeing's relevance to development can be demonstrated by the inclusion of wellbeing metrics in the United Nations' Sustainable Development Goals (Froding et al., 2007; Durana et al., 2015; Costanza et al., 2016; Momete, 2017), not only under goal #3 (Good Health and Wellbeing) but also under other goals not directly related to wellbeing. This has resulted in governments taking wellbeing into account in decision making and public policy to a greater degree (Galiano & Ortega, 2019). Fiscal policy, and specifically public expenditure programs and taxation, is both an essential vector for implementing policies focused on wellbeing and can reveal a society's preferences. As Martinez-Vazquez, Vulovic and Liu (2011: 51) observe, "the size of total revenue to GDP measures how much overall government a particular society wishes to have," and the distribution of that revenue can have significant impacts. At the same time, state and local governments may be better positioned to provide certain public goods than a central government because they have superior knowledge of local preferences and, therefore, ought to be able to more effectively generate wellbeing for their citizens (Dziobek et al., 2011).

Consequently, this paper investigates whether fiscal spending and taxation policies as well as decentralization can influence population wellbeing or satisfaction with life and, if so, what types of public spending programs and taxes most affect individual life satisfaction. There are many studies on the relationships of public spending and taxes with wellbeing and life

satisfaction,¹ but they are focused on specific issues such as health and unemployment rather than directly on the relationship between fiscal policy, decentralization and wellbeing, leaving a gap in the literature that this paper seeks to address.

International consensus in recent years, as represented by the United Nations efforts, shows an increased preference for public policies that are not solely pursuing growth and development but that also consider sustainability and the wellbeing of citizens. The current literature has found no consensus on the effect of fiscal policy and decentralization on the wellbeing of citizens, leaving it an important and unanswered question that is highly relevant to ongoing policymaking. Consequently, this paper focuses on three main issues in relation to government action: government structure (decentralization), public revenues and expenditures, and the foregoing's effects on the wellbeing of citizens.

The main goal of this paper is to increase the field's understanding of the impact on life satisfaction of the overall level of decentralization and government finance, of separate variations in levels of decentralization and government finance, and of the joint effects of these variables. To do so, I employ individual survey information from the World Values Survey (WVS) covering 109 countries in four waves from 1999 to 2018. My analysis, unlike other papers based on the same WVS waves, uses these surveys to create four waves that account for periods of economic crisis (*3waves*). I test four relationships by constructing the life satisfaction (SL) dependent variable differently for each. The first variable, *Satisfyes*, is constructed as a dichotomous variable that takes a value of 0 when life satisfaction is less than 7 and a value of 1 when SL is equal to or more than 7 (model 1). The second, *Satisfyes2*, is also a dichotomous variable, but instead takes a value

¹ See, for example: Layard, 1980; Bjørnskov et al., 2008; Kotakorpi & Laamanen, 2010; Frijters et al., 2012; Ferrer-i-Carbonell & Gërkhani, 2016; Nadirov et al., 2017.

of 0 when the satisfaction score is under 8 and 1 when satisfaction is equal to or over 8 (model 2). The third iteration, *Satisf*, is a scale variable taking direct 1-10 scores of life satisfaction from the raw data (model 3). The fourth variable, *4Satisf4l*, is an ordered ordinal variable with values from 0 to 3. Individuals with a satisfaction level of 0-4 are coded as 0, individuals with a satisfaction level of 5-6 are coded as 1, individuals with a satisfaction level of 7-8 are coded as 2 and individuals with a satisfaction level of 9-10 are coded as 3.

The reason for conducting four treatments with four models of life satisfaction in one study is to provide different and complementary information that yields a greater understanding of the relationship between life satisfaction, decentralization, and fiscal policy. Models 1 and 2 have different binary responses and have been run to observe how public revenues, public expenditures and decentralization affect SL if one category is added to the constraint. The third model is conducted to study whether an increase of one unit of public revenue, public expenditure and decentralization has a positive or negative effect on life satisfaction. Finally, the fourth model provides us with segmented information on the indicator in four categories, as it uses the Odd Ratio (OR) calculation to estimate the probabilities of being in a specific SL category compared to a baseline category, thus informing us of the variation of the factor between categories. The contribution of this work is to study the effect of public revenues, public expenditures and decentralization on the life satisfaction of citizens using several specifications based on the Life Satisfaction (SL) index, allowing experimentation with different models to analyze the impact of state organization and fiscal policy on wellbeing.

The results indicate:

- Indirect taxes on goods and services and taxes on payroll and workforce increase the probability of reporting high satisfaction with your life. This may be related to the "Mill

hypothesis² of fiscal illusion.

- Expenditures related to environmental protection and education increase the probability of reporting high satisfaction with your life. Unlike expenditures on recreation, spending on culture, religion and health decrease it.
- Increased decentralization can improve the likelihood of having a life satisfaction greater than 6 after including revenue from transfers received from other government units, foreign governments and international organizations.
- An increase in the net transfer of sub-national (state and local) revenue decreases the probability of being satisfied with life.

The rest of the paper is structured as follows. In the next section, I provide an overview of the existing literature on decentralization and government finance effects on satisfaction life and then state the paper's hypothesis. Section 3 describes the data and methodology and Section 4 contains the empirical results. The last section concludes.

2. Literature Review and Basic Hypotheses

Wellbeing and happiness, sometimes called flourishing, are complex concepts. The economic approach to these issues can be categorized into those focusing on either the microeconomic scale (individuals, businesses, organizations) or the macroeconomic level (countries) using different approaches such as subjective wellbeing (SWB), quality of life (QoL), happiness and life satisfaction (SL). These are all related concepts but with different nuances.

² This hypothesis is based on tax extraction through indirect taxes is underestimated compared to direct taxes, because it is less visible to taxpayers (Sausgruber & Tyran, 2005).

2.1 Measures of flourishing

2.1.1 Subjective wellbeing

Subjective wellbeing (SWB) includes components of “happiness, life satisfaction, hedonic balance, fulfillment, and stress, and holds at its core affective and cognitive evaluation of one’s life. It also extends from the specific and concrete to the global and abstract: momentary experiences versus people’s global judgments about their entire lives” (Kim-Prieto et al., 2005: 261).

2.1.2 Quality of life

In contrast, quality of life (QoL) as an index is closer to the efforts of the welfare state and is influenced by the effects of social policies (Zapf, 1984; Niedzwiedz et al., 2014). Despite these nuances, many researchers still use QoL as an equivalent of wellbeing in the social sphere (Sirgy, 2002; Tonon, 2015), although for Diener (2006) the QoL contains more indicators that are objective and focuses on a person's life circumstances rather than their reaction to them and can allow for confounding effects when studying policies that also affect those circumstances as well as sensations around them.

2.1.3 Happiness

Unlike the more quantitative QoL, happiness as a concept is more focused on the feelings of the individual. These feelings are quantified in WVS using four answer choices to the question “Taking all things together, would you say you are,” with answers: very happy, quite happy, not very happy or not at all happy. Czikszentmihalyi (1990) states that the level of happiness depends on how the mind selects and interprets everyday experiences and that the flow to create meaning in life generates individual happiness. For Veenhoven (2000), happiness is used to describe the emotional state of the individual and depends on the individual assessing their own life, their subjective appreciation and their evaluation of experiences; it is a general assessment by the individual of all facts, experiences and feelings in their life, making it a concept relative to the

individual rather than a strictly empirical measure, although it includes their needs, resources, culture and the environment in which they function as social beings (Shin & Johnson, 1978).

Rodríguez-Pose and Maslauskaitė (2012) state that GDP per capita is possibly the most prominent among the potentially interfering variables. Its relation with happiness tends to be non-linear and its only certain effect on happiness a negative one—an unexpected fall in income makes people unhappier, although studies by Easterlin (2013:13) show that “economic growth in itself does not raise happiness,” and growth and happiness go together in a positive relationship in the short term but maintain a null relationship in the long term.

2.1.4 Life satisfaction

The aforementioned fourth approach to happiness, life satisfaction (SL), reflects the quality of people’s social lives, not just their income (Helliwell, 2006). In the health area, life satisfaction scores can help estimate the burden of illnesses and quality-adjusted life years (Dolan & White, 2007). The study of the evolution of life satisfaction is important because it is a way to measure wellbeing and happiness in a complete way, to add information that other measures do not provide. It does not replace but rather complements other indicators and “may best reflect the concepts of happiness and quality of life because life satisfaction best reflects the philosophical notion of the good life” (Frisch et al., 2005: 24). Life satisfaction as an indicator has been proven as more stable through time to measure wellbeing. According to Pavot and Diener (2009), it shows a temporal stability degree of 0.54 over four years, possibly because it depicts the conscious assessment of one individual over their life using their own criteria. Also, life satisfaction at the country level has been shown to correlate with:

- political and civil rights (Diener et al., 1995),
- political freedom (Veenhoven, 2005),

- corruption (Oishi & Roth, 2009),
- GDP per capita (Diener et al., 2010),
- average family social income (Diener, 2009; Diener et al., 2012)—although as financial needs become covered, free choice is a stronger predictor of life satisfaction than money (Pavot and Diener, 2009),
- inequality (Alesina et al., 2004; Rözer & Kraaykamp, 2013),
- health and life expectancy (Veenhoven, 1996; Perenboom et al., 2004; Helliwell, 2006; Dolan & White, 2007; Elgar et al., 2011; Corrigan et al., 2013; Gorry et al., 2018),
- continuous unemployment (long term) (Luhmann & Eid, 2009),
- culture (Suh et al., 1998; Oishi, 2006; Diener, 2009; Rodriguez & Imada, 2013), and
- religion (Okulicz-Kozaryn, 2010).

These multiple vectors of correlation demonstrate the reliability and suitability of SL as an indicator.

For unemployment, there is a wide consensus: many studies find that unemployment and specifically job insecurity are negatively related to life satisfaction; wherever unemployment is high, job insecurity is also high (Tella et al., 2001; Kassenboehmer & Haisken-DeNew, 2009; Clark et al., 2010; Boyce et al., 2010; Easterlin et al., 2012; Binder & Coad, 2013; Easterlin, 2013). Chadi (2014: 1111) particularly notes that “individual unemployment is even more hurtful when regional unemployment is higher.” Studies such as Winkelmann and Winkelmann (1998) find that unemployment has a significant negative impact not only from loss of revenue but also due to the psychologic cost of loss of self-esteem and social position and does not differentially affect

satisfaction according to age or length of unemployment as it is not linear but rather a U-shaped curve. A Burchardt (2005) study on subjective assessments of financial wellbeing at time t for individuals with a given income level also introduces unemployment as control variable.

Another indicator studied in relation with life satisfaction is Human Development Index (HDI) score, generally finding a directly significant relationship between the two (Vemuri & Costanza, 2006; Leigh & Wolfers, 2006; Li & Bond, 2010). Anomalously, one study by Mookerjee and Beron (2005) shows a negative relationship between HDI and degree of happiness that is difficult to explain.

A study by Lawless and Lucas (2011) on several areas in the United States identifies strong correlations of life satisfaction and average educational attainment of the region, as well as correlations with income, population density and health. It also shows a connection with poverty level of -0.46 and a negative correlation with housing expenditure (mortgage or rent) over 35% of income, although results show a weaker correlation with unemployment compared to other authors. Rentfrow et al.'s (2009) study on the U. S. shows that states with the highest citizen wellbeing have residents who are richer, better educated, more tolerant and more emotionally stable compared with citizens from states with lower wellbeing. Analyses also indicate connections between wellbeing, class structure, diversity and personality after controlling for income. Specifically, wellbeing is related to having children and getting married (Luhmann et al., 2012).

Given the aforementioned features of life satisfaction as a measure of wellbeing and the robust measurement scale of 1-10 used by the WVS's execution of SL measurement, I considered the SL index from the survey by World Values Survey to be the most appropriate metric to be compared to a state financial structure (degree of decentralization) and budgetary structure for wellbeing analysis.

2.2 Life satisfaction and government policies

Some studies, such as Bjørnskov et al. (2007), find the size of government to have a negative correlation with life satisfaction ($\rho = -0.54$). That study also showed that some expenditures such as government capital goods formation spending and welfare expenditures show different correlations with life satisfaction, positive 0.34 and negative -0.20 respectively, and general government expenditures, or perhaps excessive public expenditures, harm individual quality of life. A welfare state as a mechanism to combat inequality requires a redistribution of revenue from residents and/or their businesses, involving higher taxes for higher income. In this context, citizens take different positions depending on their social status, income, culture and ideology or preferred model of state. Thus, it logically follows that “the approach from the side of expenditure for revenue allotment informs us on the relevance of tax autonomy and the desired level of self-financing” (Martinez-Vazquez, 2014: 8).

Some studies find that citizens of states with social democrat policies (Norway, Denmark, etc.) have higher wellbeing (Deeming & Hayes, 2012), but others show that it depends on the positive effect of public expenditures in relation with the loss of wellbeing caused by associated taxes and reduced consumer choice (Manzano, 1998). Not all taxes have the same impact on wellbeing, as Atkinson & Stern (1980) show; in their study, a move from direct taxes to indirect taxes improves wellbeing (represented by salaries and income as a lump sum). Consequently, it is important to use wellbeing metrics to help policy makers design optimal tax structures that maximize tax revenue without reducing societal wellbeing (Diener et al., 2009; Adler & Seligman, 2016). Likewise, researchers can assume that policies aiming at wellbeing have an influence on factors determining life satisfaction—unemployment, income, education and civil status from an individual perspective and the unemployment rate and inflation from a macroeconomic perspective (Frey & Stutzer, 2000). Consequently, the literature displays several different positions regarding

the relationship among wellbeing, the welfare state and taxes.

2.3 Life satisfaction and decentralization

There is consensus in literature regarding decentralization and its positive, significant relationship with economic growth (Davoodi & Zou, 1998; Lin & Liu, 2000; Martinez-Vazquez & McNab, 2003; Bodman, 2011; Faridi, 2011; Gemmell et al., 2013; Baskaran & Feld, 2013; Yushkov, 2015; Baskaran et al., 2016). The relation of decentralization with other factors has also been studied. The model and empirical analysis presented by Panizza (1999) shows that the size of the country, per capita income, ethnic fractionalization and level of democracy are negatively correlated with the degree of fiscal centralization.

However, few studies have researched the effects of decentralization on life satisfaction. There is an analysis of the effects of federalism in Switzerland which concludes that “institutions in the form of type of democracy and extent of political decentralization crucially affect individual well-being” (Frey & Stutzer, 2000:159). A study by Bjørnskov, Dreher and Fischer (2008) analyzes the impact of fiscal and political decentralization on subjective wellbeing in a cross-section of 60,000 individuals from 66 countries, showing that with more spending or revenue decentralization, wellbeing increases. They estimate these models using a weighted ordered probit approach with grouping at the country level, with the result that “decentralization in policy-making, measured by local autonomy or residual power, or in administration, do[es] not significantly affect well-being” (p.149) Also relevant is the work carried out by Letelier-S & Sáez-Lozano (2020), which analyzes whether fiscal decentralization of education, health, housing, social protection, recreation, culture and religion, public order and safety, and transportation have a significant effect on individual wellbeing. It presents three models estimating multilevel ordinal logic: model 1 with a random intercept, model 2 with random intercept and fixed effects as well

as an individual explanatory variable and model 3 as an ordinal logit with a random intercept and fixed effects. That study's authors matched 89,584 observations from the World Values Service and the European Values Service to individual wellbeing in 30 countries as per IMF Government Finance Statistics (GFS) at two hierarchical levels from different waves: individual data (level 1) and country-level data (level 2). The results show a negative effect of fiscal decentralization in education and housing on individual wellbeing, and a positive effect on health, culture and recreation. There is also work by Gao, Meng and Zhang (2014) that finds that greater revenue decentralization increases life satisfaction, and, in terms of income distribution, both the rich and the poor gain from revenue decentralization. Conversely, Wrede (1997) states that under specific circumstances, in countries with more than one level of local government, there is a smaller offering of local public goods compared to centralized states.

The present study, unlike those previously mentioned on the relationship between wellbeing and decentralization or government finance, focuses on wellbeing's relationship with the different categories and not on wellbeing at a general level. The construction of the four SL variables with different cut-offs in the categories allows us to obtain results that provide information on the relationship of the variables studied by categories. I also seek to further test the study carried out by Bjørnskov, Dreher and Fischer (2008: 149) where, using different decentralization indicators, their analysis results in findings of "decentralization in policy-making, measured by local autonomy or residual power, or in administration, [...] not significantly affect[ing] well-being."

2.4 Basic hypotheses

This review of available bibliography offers differing results regarding life satisfaction and

variables related to public revenue, public expenditures and decentralization. Therefore, I found it appropriate to focus this research on four different approaches to one single variable, satisfaction with life (SL), which contains 10 levels, and to explore it using four different models (two logit models, one Ordinary Least Squares model, and one stereotype logistic model [Slogit]) with variables for public revenue, public expenditures, decentralization and other control variables. I use these models to test the following hypotheses:

H1: Individuals who pay more taxes are more satisfied with their life than those who pay less taxes.

H2: Individuals from countries with higher expenditures on environmental protection and health have higher life satisfaction.

H3: Individuals from countries with a more decentralized policy structure show higher probability of having life satisfaction equal to or above 7 than do individuals from more centralized states.

H4: A period of widespread financial crisis has a negative impact on life satisfaction.

3. Data, Variables and Model Selection

This work like many other studies on happiness and life satisfaction cross-referenced individual data on happiness with macroeconomic data for the countries under study (Blanchflower & Oswald, 2011; Rodríguez-Pose & Maslauskaitė, 2012). Macroeconomic factors such as GDP per capita (GDPpc), education, health and welfare systems for membership in rich societies have a well-established relationship with happiness, meaning these are factors to be controlled for. Databases used in this study are the World Values Survey (WVS), European Values Study (EVS), IMF's Government Finance Statistics Database (GFS) and the World Bank. The Databases WVS and EVS provide data on the dependent variable, satisfaction with life. Both

sources could be used as the WVS website directs users interested in the countries of Europe to study the EVS and previous authors have used both surveys in different fields of research (Martinez-Vazquez & Torgler, 2009; Rözer & Kraaykamp, 2013; Diener et al., 2013). WVS features data obtained from citizens in 109 countries at the individual level. Governmental data (on revenue, expenditures and decentralization) come from GFS, while both GFS and the World Bank provided macroeconomic data on countries under study. All of the above datasets were input into statistical software Stata (version 16) for analysis.

3.1 Variables

3.1.1 Dependent Variable

Previously, I established the reasons to select life satisfaction as the variable to study happiness and wellbeing with public revenue, public expenditures and decentralization as independent variables. Several previous studies focus on these relationships, but this study is different because it shows different models depending on the treatment of the life satisfaction indicator. To that end, the dependent variable (SL) has been constructed in four different ways (one per model) using data from hundreds of surveys carried out from 1999 to 2018 by the World Values Survey and European Values Study groups across 109 countries:

- *Satisfyes*. Dichotomous variable with value 0 (relative frequency = 46.76%) when life satisfaction is less than 7 and 1 when it is equal to or more than 7 (relative frequency 51,24%). Observation frequency was account for by this cut.
- *Satisfyes2*. Dichotomous variable with value 0 (relative frequency = 61.98%) when life satisfaction is less than 8 and 1 when it is equal to or more than 8 (relative frequency = 38.02%).
- *Satisf*. Categorical variable with a scale of life satisfaction values from 1 to 10.
- *Satisf4l*. Ordinal variable with four categories with values from 0 to 3. Individuals with

satisfaction levels at values 0-4 (relative frequency = 28.19%) are assigned value 0, while value 1 is for individuals with satisfaction levels at 5 or 6 (relative frequency 20.57%), value 2 is for individuals with satisfaction levels at 7 or 8 (relative frequency 30.12%), and value 3 is for individuals with satisfaction levels at 9 or 10 (relative frequency 21.12%).

3.1.2 Independent Variables

Independent variables were selected based on different criteria. First, subnational decentralization variables were selected because there are few studies analyzing the relationship between decentralization and fiscal policy with individual life satisfaction, and these studies show differing results, spurring this paper's investigation. Second, after a preliminary analysis of all variables measuring the general government expenditure as a percent of GDP, I selected the most representative (that is, those that are most likely to be relevant to wellbeing) variables, such as expenditures on environmental protection. Finally, I included public revenue variables affecting individuals in general (as opposed to those affecting only specific groups). Consequently, the selected independent variables are as follows:

Revenue (general government revenue as a percent of GDP)

- PIT. Taxes on income, profits, and capital gains: individuals (Personal Individual Tax)
- PWT. Taxes on payroll and workforce
- PT. Taxes on property
- GST. Taxes on goods and services
- SCT. Social contributions

Expenditure (general government expenditures as a percent of GDP)

- Safety. Expenditure on public order and safety
- Economic. Expenditure on economic affairs

- Environment. Expenditure on environment protection
- Housing. Expenditure on housing and community amenities
- Health. Expenditure on health
- Culture. Expenditure on recreation, culture, and religion
- Education. Expenditure on education
- Social_Protect. Expenditure on social protection

Fiscal decentralization (where sng = subnational government)

- taxd_sng. Tax revenue decentralization (ratio of taxes to general government taxes),
subnational
- rd_sng. Revenue decentralization (ratio of own³ revenues to general government revenues),
subnational
- sd_sng. Expenditure decentralization (ratio of own spending to general government spending),
subnational
- transferDep1_sng. Transfer dependency method 1, ratio of net transfers to own spending,
subnational
- transferDep2_sng. Transfer dependency method 2, ratio of net transfers to own revenue,
subnational
- vfi_sng. Vertical fiscal imbalance (calculated as 1- the ratio of own revenue to own spending),

³ Own revenue excludes the portion of revenue received as transfers from other government units, foreign governments and international organizations and own spending excludes the portion of expenditures transferred to other government units, foreign governments, and international organizations (Lledó et al., 2018).

subnational

3.1.3 Control Variables

The review of the literature summarized above detected a number of variables relevant for wellbeing studies and that consequently should be considered as potential control variables. This review highlighted the relationship between wellbeing and unemployment (as a percentage), GDP per capita, GDP growth (percentage), life expectancy (HLife, years) and Human Development Index score (HDI, percentage).

The fixed effect variables used in the estimation are time represented as (WAVE) and countries as (COUNTRY). Waves were not constructed using the same periods as the World Values Survey so that a single wave (*3wave*) encompasses the entire period of financial crisis (that is, the Great Recession). New waves were created based on survey years, maintaining a balance between financial situation, number of countries and individuals polled. From this, the four waves are as follows:

1. 1wave. Surveys carried out in 1999-2002 on 69 countries. 95,817 (24,28%) individuals polled over the overall survey.
2. 2wave. Surveys carried out in 2003-2007 on 57 countries. 82,342 (20,95%) individuals polled.
3. 3wave. Surveys carried out in 2008-2012 (worldwide financial crisis), 74 countries. 132,583 (33,44%) individuals polled.
4. 4wave. Surveys carried out in 2013-2018 on 47 countries. 81,599 (21,33%) individuals polled.

Also, regarding the COUNTRY variable, it should be noted that not all countries were

surveyed in all four waves. Out of 109 countries, 14 were surveyed in four waves, 28 in three waves, 40 in two waves and 27 in one wave.

3.2 Model Selection

The model may be specified as

$$SL_{ijt} = \beta_0 + \sum_{l=1, \dots, e} \beta_l REV_{it} + \sum_{l=e+1, \dots, f} \beta_l exp_{it} + \sum_{l=f+1, \dots, g} \beta_l DES_{it} + \sum_{l=g+1, \dots, h} \beta_l X_{it} + I(COUNTRY_j)\beta_{h+1} + I(WAVE_t)\beta_{h+2} + \varepsilon_{it}$$

where the dependent variable SL_{ijt} is satisfaction with life, measuring in individual i how satisfied they are with their life as a whole these days, in country j at WVS wave t . I include four vectors whose variables have been mentioned previously. The first is public revenue indicators, the second public expense indicators, the third decentralization indicators and the fourth control indicators. I also include dummy variables to control for country j and wave t fixed effects in vectors $I(COUNTRY_j)$ and $I(WAVE_t)$ and cluster standard errors at the country level.

Results were achieved using two logit models (Aldrich & Nelson, 1984; Hosmer & Lemeshow, 2000; Cramer, 2003), a linear regression model and a stereotype logistic regression (Slogit) model following Anderson (1984), Liu (2014), Kersten (2016) and Fernandez, Liu and Costilla (2019). All four models use the same control variables and fixed effects as described above.

4. Results

I built four robust models with dummy variables to control for country j and wave t fixed effects in vectors $I(COUNTRY_j)$ and $I(WAVE_t)$ and cluster standard errors at the country level that are statistically valid.

Model 1 show a positive significant relationship with the personal individual (PIT) and goods and services (GST) taxes; the environment, education and social protection spending

programs; sd_sng and vfi_sng fiscal decentralization; GDPgrowth and time period covered by variables 2waves, 3wave and 4wave. It shows a significant, negative association with property taxes (PT), health and culture spending programs, transferDep2_sng fiscal decentralization, unemployment (UnEmpl) and life expectancy (HLife) (Table 1).

The study of the marginal effect on model 1 shows how the probability of Life Satisfaction equal to or more than 7 changes if the independent variables change in one unit. This effect is strongest in positive decentralization variable sd_sng (0.8969***). Overall, the marginal effect in model 1 is significant, positive and shows a result of 0.64 points; consequently, the probability of an individual citizen having satisfaction of 7 or more when all variables are average is 64.77%, with a confidence of 95% that the probability is between 64.50% and 65.05% (Table 1) and the model has a correctly classified share of 68.16%.

Table 1. Predictive Margins Model 1

Predictive margins					Number of obs = 102,619	
Model VCE : Robust						
Expression : Pr(satisfyes), predict()						
	Delta-method					
	Margin	Std. Err.	z	P> z	[95% Conf. Interval]	
_cons	0.6477358	0.001409	459.72	0.00	0.6449742	0.6504974

Source: Compiled by authors

Model 2 also has a dichotomous dependent variable, but in this specification, it takes a value of 0 when life satisfaction is below 8, rather than 7, and 1 when it is equal to or above 8. This change in the model has led to a different result. It shows a positive significance at $p < 0.01$ with PIT, payroll and workforce (PWT) and GST taxes; the economic, environmental, education and social protection spending programs, revenue and expenditure decentralization and vertical fiscal imbalance (vfi_sng); GDP growth and the time period covered by the 2wave, 3wave and 4wave variables. Again, it has a significant, inverse relationship with property taxes, health and

culture spending programs, transfers (transferDep2_sng), unemployment and life expectancy. It is notable that, unlike in the previous model, payroll and workforce taxes (PWT) and economic spending programs have a positive relationship to wellbeing at a significance of $p < 0.01$ (Table 2).

Table 2. Logit and Linear Regression Model Coefficient Estimates and Marginal Effects

	Model 1 logit	Model 1 marg. eff.	Model 2 logit	Model 2 marg. eff.	Model 3 regress
	satisfies	satisfies	satisfyes2	satisfyes2	satisf
PIT	0.104*** (0.0223)	0.0211***	0.0613*** (0.0213)	0.0139***	
PWT	0.212** (0.0856)	0.0432**	0.443*** (0.0878)	0.1005***	0.709*** (0.0724)
PT	-0.471*** (0.118)	-0.0960***	-0.403*** (0.123)	-0.0915***	-1.384*** (0.105)
GST	0.143*** (0.0183)	0.0292***	0.130*** (0.0189)	0.0296***	0.140*** (0.0163)
SCT					0.185*** (0.0175)
Economic			0.0504*** (0.0183)	0.0114***	0.0828*** (0.0176)
Environment	0.439*** (0.0655)	0.0894***	0.306*** (0.0715)	0.0695***	0.293*** (0.0635)
Health	-0.122*** (0.0260)	-0.0249***	-0.110*** (0.0256)	-0.0250***	-0.210*** (0.0234)
Culture	-0.300*** (0.112)	-0.0612***	-0.673*** (0.128)	-0.1527***	-0.754*** (0.114)
Education	0.304*** (0.0524)	0.0619***	0.299*** (0.0537)	0.0678***	0.593*** (0.0449)
Social_ Protect	0.0795*** (0.00920)	0.0162***	0.0621*** (0.00948)	0.0141***	
taxd_sng					3.936*** (0.593)
rd_sng			3.285** (1.425)	0.7456**	
sd_sng	4.401*** (0.736)	0.8969***	2.715*** (0.957)	0.6163***	
transfer Dep2_sng	-0.246*** (0.0256)	-0.0502***	-0.191*** (0.0271)	-0.0432***	-0.0809*** (0.0185)
vfi_sng	3.111*** (0.410)	0.6339***	3.983*** (0.495)	0.9041***	
UnEmpl	-0.0655*** (0.00751)	-0.0134***	-0.0721*** (0.00858)	-0.0164***	-0.0623*** (0.00549)
Hlife	-0.113*** (0.0111)	-0.0230***	-0.143*** (0.0117)	-0.0325***	-0.0741*** (0.0110)
GDPgrowth	0.0517***	0.0105***	0.0381***	0.0086***	0.0184***

	(0.00474)		(0.00492)		(0.00410)
2.wave	0.230***	0.0488***	0.169***	0.0366***	0.361***
	(0.0407)		(0.0372)		(0.0367)
3.wave	0.615***	0.1260***	0.577***	0.1273***	0.682***
	(0.0461)		(0.0466)		(0.0454)
4.wave	0.522***	0.1080***	0.682***	0.1504***	0.832***
	(0.0872)		(0.0837)		(0.0829)
Constant	4.822***		5.023***		9.005***
	(0.762)		(0.958)		(0.911)
Observations	102,619		102,619		103,311
R-squared					0.1194
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1					

Source: Compiled by authors

Marginal analysis shows that the factor with the highest probability to change Life Satisfaction to be equal to or above 8 by changing one unit in the independent variable is vertical fiscal imbalance (vfi_sng , 0.9041***). Overall, the marginal effect in model 2 is significant and positive, though lower than model 1 with a change of 0.48 points rather than 0.65. Consequently, the probability of an individual citizen having satisfaction of 8 or more when all variables are average is 48.17% with a confidence of 95% that the probability is between 47.89% and 48.46% (Table 3) and the model has a correctly classified share of 62.71%.

Table 3. Predictive Margins Model 2

Predictive margins					Number of obs = 102,619	
Model VCE : Robust						
Expression : Pr(satisfyes2), predict()						
	Delta-method					
	Margin	Std. Err.	z	P> z	[95% Conf. Interval]	
_cons	0.4817724	0.0014874	323.91	0.00	0.4788572	0.4846876

Source: Compiled by authors

Comparing the marginal effects of the tax and the spending programs with the Life Satisfaction in both models, Personal Individual Taxes present the higher tax effect in model 1 (0.0211) while Payroll Workforce Taxes do so (0.1005) in model 2. Environment and culture spending programs have the largest spending program effects in both models, although the environment spending effects are larger in model 1 (0.0894) while the culture effects are in larger

in model 2 (-0.1527).

Model 3 was implemented as an Ordinary Least Squares (OSL) regression with the dependent variable *Satisf* distributing life satisfaction on a scale of values 1 to 10. Value 10 was assigned to individuals very satisfied with their life, and value 1 to individuals little satisfied with their life (the scale of the WVS survey item).

The results of this model (shown in Table 4) showed a positive significance at $p < 0.01$ in payroll and workforce, goods and services and social contributions taxes; economic, environmental, education and social protection spending programs; for tax revenue decentralization and with control variables for economic growth. Results further show an inverse relationship significant at $p < 0.01$ with Property Taxes (PT); health and culture spending programs; transfers (transferDep2_sng) and with control variables unemployment (UnEmpl) and life expectancy (HLife). In contrast to previous models, personal individual tax and social protection spending programs are not significant while the social contribution tax shows a positive significance. Tax revenue decentralization is the variable with the highest effect in model 3 (3.936***).

Table 2. Slogit Model Coefficient Estimates and Odds Ratios

	Satisf4l	z	OR (0,3)	OR (1,3)	OR (2,3)	OR (3,0)	OR (3,1)	OR (3,2)
PIT	0.0773*** (0.0289)	2.68				1.0804	1.0582	1.0155
PWT	0.762*** (0.133)	5.73				2.1426	1.7468	1.1288
PT	-1.591*** (0.156)	-10.21	4.9087	3.2047	1.2878			
GST	0.174*** (0.0254)	6.84				1.1901	1.1358	1.0281
SCT	0.270*** (0.0322)	8.38				1.3100	1.2185	1.0439
Safety	0.0974* (0.0532)	1.83						
Economic	0.0786*** (0.0243)	3.23				1.0818	1.0592	1.0126

Environment	0.458*** (0.0932)	4.91				1.5809	1.3983	1.0755
Health	-0.250*** (0.0356)	-7.02	1.2840	1.2008	1.0406			
Culture	-1.075*** (0.182)	-5.91	2,9300	2.1966	1.1864			
Education	0.670*** (0.0710)	9.43				1.9542	1.6330	1.1124
Social_Protect	-0.00831 (0.0136)	-0.61						
taxd_sng	4.668*** (0.920)	5.07				106.4846	30.4771	2.1006
transfer Dep2_sng	-0.179*** (0.0327)	-5.47	1.1960	1.1400	1.0289			
UnEmpl	-0.0827*** (0.0085)	-9.69	1.0862	1.0624	1.0132			
Hlife	-0.108*** (0.0158)	-6.81	1.1140	1.0823	1.0173			
GDPgrowth	0.0298*** (0.0064)	4.65				1.0302	1.0221	1.0047
2.wave	0.487*** (0.0576)	8.45						
3.wave	0.965*** (0.0680)	14.19						
4.wave	1.176*** (0.140)	8.43						
Constant			phi1_1	phi1_2	phi1_3	theta1	theta2	theta3
Observations	103.596		1	0.732*** (0.0105)	0.159*** (0.0115)	4.792*** (1.319)	-3.166*** (0.971)	-0.115 (0.218)
Observations Wald chi2(51) = 8255.82 Prob > chi2 = 0.0000 satisf4l=3 is the base outcome								
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1								

Source: Compiled by authors

Model 4 applies the stereotype logistic regression approach with one ordinal dependent variable (*Satisf4l*) presenting four categories (j), dividing the 10 levels of the life satisfaction indicator into four unequal but ordered categories (0,1,2,3), where $\beta_1, \beta_2, \dots, \beta_p$ are logit coefficients for the predictors, X_1, X_2, \dots, X_p , respectively, and ϕ_j are the constraints which are used to ensure the outcome variable is ordinal if the following condition is satisfied. Being represented as Theta (θ_j) included for each equation to have a constant unrestricted term and phi1_j (Φ_{pj}) as scale parameters to be estimated alongside β_p , in model [phi1_1]_cons = 1 (satisfaction levels 0-4) in Table 4.

$$\eta_j = \theta_j - \sum_{p=1}^d \Phi_{pj} x_p \beta_p$$

In j , value 0 is assigned to satisfaction levels 1-4, value 1 to levels 5 and 6, value 2 to life satisfaction value of 7 or 8, and value 3 for individuals with life satisfaction value at 9 or 10. Model results show Wald $\chi^2(51) = 8255.82$, $\text{Prob} > \chi^2 = 0.0000$, $\phi_{1_1}(\Phi)=1$, $\phi_{1_2}(\Phi)= 0.732^{***}$, $\phi_{1_3}(\Phi)= 0.159^{***}$ and $\phi_{1_4}(\Phi)= 0$ and $\text{satisf4l}=3$ is the base outcome. Variable coefficients, significance, z values and Odds Ratio (OR) vales are listed in Table 4 above. This model estimates logit probabilities of falling into a category in relation with the reference category.

The significant predictive variables at $p < 0.01$ are similar to those found for the previous three models, with positive effects by Personals Individual Taxes (PIT), Payroll and Workforce Taxes (PWT), Goods and Services Tax (GST) and Social Contributions Taxes (SCT); economic, environment and education spending programs; tax revenue decentralization and with control variables economic growth (GDPgrowth) and time period covered by variables wave2, wave3 and wave4.

Results further show an inverse association significant at $p < 0.01$ on Property Taxes (PT); health and culture spending programs; transfers (transferDep2_sng) and with control variables unemployment (UnEmpl) and life expectancy (HLife). These logit coefficients compared the probability of falling in the reference category versus the lowest category (Liu, 2014).

The calculation of an Odds Ratio (OR) shows “the odds ratio of being in a category j versus the baseline category J ... obtained by taking the exponential of $[(\theta_j - \theta_J) - (\phi_j - \phi_J)\beta]$ ” (Liu, 2014: 538). Where ϕ_j (ϕ_{1_j}) is a list of ordinal restrictions with the first restriction $\phi_1 = 1$ and the last $\phi_J = 0$ fulfilling the condition that $1 = \phi_1 > \phi_2 > \phi_3 > \dots > \phi_{J-1} > \phi_J = 0$. in this model were as follows: $\phi_1 = 1$, $\phi_2 = 0.732$, $\phi_3 = 0.159$ and $\phi_J = 0$, providing a mathematical level order., and where the OR are

calculated as:

- If the variable coefficient in the model is positive, as variable PIT (0.0773***), then $OR(3,0) = e^{(1 * 0.0773)} = 1.0804$.
- If the coefficient is negative, as variable Health (-0.250***), with OR (0,3) (the inverse), then $OR(0,3) = e^{(-1 * -0.250)} = 1.2840$.

In these formulas the Odds Ratio value are calculated for all variables with a significance of $p < 0.01$ (table 2). In the Slogit model, four significant variables in public revenue (PIT, PWT, GST and SCT) show positive coefficients and on three their OR values (3, j) are very close to 1, especially at categories 3 to 2; consequently, the effect in that category is not so relevant. Of the four taxes, the highest OR is on Payroll Workforce Taxes (PWT). This would be interpreted as the probability of being in category 3 (satisfaction values 9-10) versus category 0 (satisfaction values 1-4) 2.1426 is times greater after a one unit increase on PWT. The probability of such a move to category 1 (satisfaction values 5-6) is 1.7468 and to category 2 (satisfaction values 7-8) is 1.1288. In the inverse sense, property tax stands out with an OR (0,3) showing that the probability of being in category 0 (satisfaction values 0-4) in relation with category 3 (satisfaction values 9-10) is 4.9087 times greater after a one unit increase Culture, in category 1 $OR(1,3) = 3.2047$ and in category 2 $OR(2,3) = 1.2878$.

Significant variables in the group of public expenditure were economic, environment, health, culture and education and their respective coefficients in the Slogit model 0.0786, 0.458, -0.250, -1.075 and 0.670. Some of them stand out because their OR values are not very close to 1, specifically variables education and culture. In the first one, as it is positive, I use OR (3,0), and it would be interpreted as the probability of being in category 3 (satisfaction values 9-10) in relation

with category 0 (satisfaction values 1-4) is 1.9542 times greater after a one-unit increase on education spending programs, in category 1 (satisfaction values 5-6) (OR 3,1) = 1.6330 and in category 2 (satisfaction values 7-8) OR (3,2) = 1.1124. In the inverse sense, variable Culture stands out with an OR (0,3), showing that the probability of being in category 0 (satisfaction values 0-4) versus category 3 (satisfaction values 9-10) is 2.93 times greater after a one unit increase Culture, in category 1 OR (1,3) = 2.1966 and in category 2 OR (2,3) = 1.1864.

Noteworthy OR are related to decentralization variables (taxd_sng and transferDep2_sng). The first two show a direct relationship and are analyzed from OR (3, J) and the other inverse and, consequently, are analyzed from OR (J,3). The highest OR of model 4 is on tax revenue decentralization (positive). OR (3,0) for tax revenue decentralization shows that the probability of being in category 3 (satisfaction values 9-10) versus category 0 (satisfaction values 1-4) was 106.4845 times greater after a one-unit increase of tax revenue decentralization (taxd_sng). In category 1 (satisfaction values 5-6) it was 30.4771 and in category 2 (satisfaction values 7-8) 2.1005. Of the rest of the significant variables in this model (UnEmpl, GDPgrowth and HLife), values OR are very close to 1; consequently, the effect is not so relevant.

Therefore, the ORs of this model provide additional information to the previous models on the probability of being in category 3 (satisfaction values 9-10) with respect to the other categories. They show us that the highest improvement in probabilities is found in tax revenue decentralization (positive). The highest percentage of variation occurs in the change from categories 0 to 1 versus category 3. Among the taxes and spending programs analyzed, the highest probability shift is shown by payroll workforce taxes (positive), property taxes (negative), education spending (positive) and culture spending (negative), and overall the largest percentage of variation is in the change from category 1 to 2 versus category 3.

4.1 Summary of results

The analysis of all four models provides different and complementary information that yields a greater understanding of the relationship between life satisfaction, decentralization and fiscal policy. Variables that are positively significant at $p < 0.01$ in all four models are: payroll workforce and goods and services taxes, environmental protection and education spending programs, economic growth and time periods. Always negatively significant at $p < 0.01$ are property taxes, health and culture spending programs, transfers (transferDep2_sng), unemployment, life expectancy and time periods. Consequently, the results can be summarized by their response to each hypothesis, as follows:

1. Hypotheses 1. Some public revenues have significant positive effects in all four models, such as tax revenue on goods and services (GST) and taxes on payroll and workforce (PWT). This result is in line with Kiya's study (2012:17) which argues that "general sales tax has a positive impact" with life satisfaction and would be justified by the tax illusion hypothesis, according to which tax extraction through indirect taxes is less visible to taxpayers (Sausgruber & Tyran, 2005). The revenue from taxes on the income, profits and capital gains of individuals (PIT) is positively significant in all models but for the third. The revenue on social contributions (SCT) is directly significant in models 3 and 4 and taxes on property (PT) are inversely significant in all models.
2. Hypotheses 2. Out of the eight types of public expenditure analyzed, only four are significant in all four models: expenditures on environmental protection (Environment) and education, which have a significant positive relationship with wellbeing and thereby support hypotheses 2, and expenditures on recreation, culture, and religion (Culture) and health whose relationship with wellbeing are significant and negative and can be used to reject hypothesis 2. In

comparison of this result with other studies on the relationship between health and wellbeing, it shows the difference in effect on wellbeing of being healthy versus public health expenditures. Expenditures on social protection (Social_Protect) are significant at $p < 0.01$ in models 1 and 2. Also relevant are the results on significance of expenditures on economic affairs (Economic). This study shows that public expenditures are significant and positive at life satisfaction scores above 7 (model 2), when using the MCO model at all levels (model 3) and when using four levels (model 4).

3. Hypotheses 3. When investigating the question of whether individuals from countries with a more decentralized policy have a higher probability of life satisfaction equal to or greater than 7 compared to countries that are more centralized, the answer turns out to depend on the specific decentralization indicator under analysis. Results show that the vertical fiscal imbalance VFI as calculated at 1 - the ratio of own revenue to own spending at the subnational level (vfi_sng) and the ratio of own spending to general government spending (sd_sng) are significantly and positively related (at $p < 0.01$) to life satisfaction in models 1 and 2 and thereby support hypotheses 3. Conversely, all models show a significant negative relationship ($p < 0.01$) between life satisfaction and the subnational ratio of net transfers to own revenue (transferDep2_sng).
4. Hypotheses 4. For time effects, 4wave (economic recovery), 3wave (economic crisis) and 2wave are statistically significant at $p < 0.01$ directly in all models.

Finally, from the results of the control variables, unemployment effects coincide with those found in previous studies (significant inverse relationship in all four models). However, economic growth is directly significant in all models, in contrast to Easterlin's (2013) study, which claimed that happiness and economic growth go together in a positive relationship in the short run but

attenuates to zero in the long run. The inverse result for life expectancy in all models is relevant in contrast to the study by Perenboom et al. (2004).

5. Conclusions

This study tests how the performance of four models provides complementary and more complete information regarding the relationship between wellbeing, as measured by the life satisfaction variable, and selected budgetary and decentralization variables, as well as the control variables used in the study.

I find that all analyzed taxes, except property taxes (PT), show a positive relationship to life satisfaction in the models, although the OR values in model 4 show a less relevant effect of personal individual taxes (PIT) as the values are very close to 1 across all categories. This result is in line with the study by Akay et al (2012) which shows that the effect of taxes on subjective wellbeing is significant and positive when controlling for income net of taxes.

Public expenditure analysis highlights expenditures on environmental protection and education variables as having a significant positive result in all four models at $p < 0.01$, and consequently when either increases, it also increases the probability of a life satisfaction rating equal to or above 7 and 8 (models 1 and 2) while health and culture spending have negative and significant results. Notable, however, is that analysis of the logit model of stereotypes across ORs shows a greater difference between the categories of education and culture.

Analysis of the effects of decentralization on life satisfaction shows that tax revenue decentralization (taxd_sng) variable increases the probability of being satisfied with life with a very high OR which shows great differences between the four categories in model 4. Vertical imbalance (vfi_sng) captures the difference between own spending and own revenue at a given level of government. It shows the disparity between revenue and expenditure decentralization; its

result is significant and positive in model 1 and model 2, and consequently shows the probability of increasing life satisfaction after a one-unit increase of VFI. Thus, greater decentralization may improve the likelihood of life satisfaction above 6 but is likely to make policy coordination more complex (Oates, 2005). In contrast, all models show a significant and negative relationship between life satisfaction and the subnational ratio of net transfers to own income (transferDep2_sng). Life satisfaction will therefore depend on how decentralization is implemented, a finding close to that of Bjørnskov, Dreher and Fischer (2008), who find that local autonomy may not be associated with increased individual happiness and may even be detrimental in some cases.

As for the results of the control variables, unemployment is in line with other studies in being significant and negative in all models. Life expectancy is also negative and significant in all models, a finding contrary to the results of other authors. This may be because ageing leads to physical deterioration, sedentary lifestyles and worsening health that negatively affects wellbeing (Steptoe et al., 2015). Economic growth is directly significant in all models, in contrast to the study by Easterlin (2013). Finally, the time effect shows that waves 2, 3 and 4 are positively significant. Consequently, there is no evidence that worldwide economic crisis has had a negative effect on life satisfaction.

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