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ORIGINAL RESEARCH

# Life Satisfaction and Inequality in Slovakia: The Role of Income, Consumption and Wealth

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**Abstract**
In recent years, a small number of studies have emphasized that subjective well-being of individuals depends not only on income but also consumption and wealth. However, only a few have examined the influence of all three variables simultaneously. Empirical studies have also analyzed the role of self-centered and community-centered inequalities but the inclusion of both measures in the same specification is scarce. In a departure from much of the existing literature, this paper analyzes concurrently the influence of all three economic well-being indicators and both types of inequalities on subjective well-being. We find that absolute levels of income, consumption and wealth all have a significant positive effect that remains robust even after the inclusion of self-centered and community-centered inequalities in the regression equations. The evidence indicates that both types of inequalities are important considerations for subjective well-being, but with different influences. Self-centered inequality measured using reference group average has a positive signaling effect, while inequality defined by the position of an individual within the distribution of the relevant economic well-being indicator has a negative comparison effect. Whereas community-centered inequality in income has a positive signaling effect, consumption and wealth inequalities have a negative comparison effect.

**Keywords** Subjective well-being · Income · Consumption · Wealth · Self-centered inequality · Community-centered inequality

**JEL Classification** I31 · D12 · D31 · G51

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## 1 Introduction

The literature on the factors that determine subjective well-being or life satisfaction or happiness of individuals[1] is vast.[2] The empirical work has focused mainly on the effect of income: own absolute income, the income of a reference group relative to one's own income, and income inequality. The idea that relative position matters to an individual's subjective well-being has a long history in the social science literature (e.g., Diener & Biswas-Diener, 2002; Duesenberry, 1949, Easterlin, 1974; and Veblen, 1899) and there is substantial empirical support. In empirical studies, the reference group has been measured in two different ways: persons with similar characteristics, and residents of a specific geographical location. The relative income measure can be broadly interpreted as a measure of the self-centered inequality approach to happiness (Clark & D'Ambrosio, 2015). In this context, some studies have noted that individuals are influenced not only by the average income of the reference group, but also by the distribution of income in relation to the individual's income or by the rank-order of the individual's income within the predefined reference group (Brown et al., 2008; Knight & Gunatilaka, 2022; Wang et al., 2019). Researchers also are increasingly concerned about the effect of community-centered income inequality on subjective well-being—i.e., the effect of inequality within the relevant community irrespective of their own income or relative income (Clark & D'Ambrosio, 2015; Ferrer-i-Carbonell & Ramos, 2014; Senik, 2005 and Senik, 2009).

In recent years, a small but growing number of studies have highlighted the importance of factors other than income, especially consumption and wealth, when analyzing SWB.[3] A main reason for the dearth of such studies is that data bases which include indicators of subjective well-being usually do not include information of consumption expenditure and wealth of households.

Consumption is considered to be a more relevant measure of utility or satisfaction than income for several reasons: income affects well-being indirectly via the flow of goods and services that it allows individuals to purchase; income is a poor proxy for the actual level of consumption expenditure since a significant proportion of households consume more than they earn; income is unable to capture the impact of the composition of the consumption basket on subjective well-being (Headey et al., 2008). In a similar vein as the studies on the role of income, empirical studies on the relationship between consumption and SWB have explored the role of absolute level of consumption, reference group consumption, and the rank of an individual's consumption within the relevant reference group. In addition, studies have examined the differential impact of different categories of consumption, particularly conspicuous consumption and basic consumption (Choung et al., 2020; Noll & Weick, 2015; Wang et al., 2019; Wu, 2020).

A narrow segment of the literature argues that wealth also influences SWB, independent of the effects of income and consumption, on account of a number of desirable properties:

[1] The terms are most often used interchangeably.

[2] Notable surveys include (Clark, 2016 and 2018; Clark et al., 2008; Clark and D'Ambrosio, 2015; Dolan et al., 2008; Ferrer-i-Carbonell and Ramos, 2014; Hagerty 2000; Helliwell et al., 2012; McBride, 2001; Ngamaba et al., 2018; and Senik, 2005 and 2009).

[3] A special issue of the International Review of Economics in 2015 (volume 62, issue no. 2) was devoted to studies on the relationship between consumption and subjective well-being. Besides the studies included in this special issue, other notable studies on the importance of consumption to subjective well-being include Goldsmith (2009), Headey et al. (2008), Lewis (2014), Wang et al. (2019) and Wu (2020). The role of wealth has been explored in studies by Brown and Gray (2016), Headey and Wooden (2004), and Jantsch et al. (2022).

it exerts an influence on self-esteem, helps to smooth consumption over an individual's life cycle, provides security against income shocks, serves as collateral for debt, and generates income itself (Headey et al., 2008). Similarly to the studies on the role of income and consumption, studies on the relationship between wealth and subjective well-being examine the impact of individuals' levels of the wealth, reference group wealth, and position of an individual relative to the reference group.

This paper combines the different approaches to examining the determinants of SWB discussed in the literature. Thus, it examines the role of income, consumption and wealth on SWB in Slovakia using data collected in the 2017 Household Finance and Consumption Survey. A distinguishing feature of this Survey is that it included a question on life-satisfaction besides information on income and non-income measures of material well-being. This facilitates a variety of exercises that are not feasible using data from the vast majority of surveys that include indicators of SWB.

The paper makes several notable contributions to the empirical literature on SWB. It adds to the limited number of studies that have examined the direct influence of consumption and wealth on SWB. Goldsmith (2009), and Headey et al. (2008) include absolute measures of income, consumption and wealth in the same equation, but without any reference group measures. There are no studies that have examined the role of reference group effects for all the three variables simultaneously. Goldsmith (2009) examines the reference effects of income and consumption concurrently but does not include wealth variables in the same equation. Brown and Gray (2016) and Jantsch et al. (2024) look at the reference effects of both income and wealth together, but do not consider the role of any measure of consumption. Brokešová et al. (2021) consider the values of different wealth components, total income and the reference value of real assets, but consumption is ignored in their analysis. Knight and Gunatilaka (2022) include net wealth, relative income, and income inequality in the estimated equation, but do not consider the impact of consumption.

This paper addresses these gaps in the existing literature. The traditional specification of the relationship between SWB and income is augmented by including both consumption and wealth in the list of control variables. Also, a relationship between SWB and consumption is estimated in line with the specifications in the recent literature, but it is enhanced by the inclusion of both income and wealth as control variables. In both the estimated relationships we look at the influence of absolute and reference group measures of the variable of interest, position of an individual within the reference group, and community-centered inequality. The inclusion of both self-centered inequality and community-centered inequality in the regression equations is a notable contribution as empirical studies have seldom examined the influence of both the variables together.[4]

We conduct various sensitivity tests for different measures of the determinants of SWB. The level of consumption expenditure is measured alternatively as total consumption or its components. The measure of wealth is done in two alternative ways: net wealth and its disaggregation into assets and debt. Community-centered inequality also is measured in two alternative ways: the Gini index and inter-percentile ratio. We also conduct a sensitivity of the regression results to the reference group definition and the estimation technique of the reference group measure. Brown et al. (2015) looked at the variation in the results for relative income obtained across studies and found that the direction of relationship was sensitive to the definition and estimation technique of the reference group. In contrast to

[4] This gap is highlighted in Knight and Gunatilaka (2022).

Brown et al. (2015), our paper examines the sensitivity of the results using data for the same sample.

The regression analysis is carried out using the Ordinary Least Squares (OLS) method. Although the SWB variable is considered by economists to be ordinal and the ordered logit/probit estimation method is theoretically more appropriate in such a case, robustness check shows that the estimates obtained by the OLS method and ordered logit method are similar in both sign and significance.[5] This being the case, the OLS method is preferred because of the ease of interpretation of the results.

The rest of the paper is organized as follows. Section 2 provides a selective overview of the literature. Section 3 describes the data, while Sect. 4 sets out the empirical framework. Section 5 presents the results of the econometric exercise and Sect. 6 conducts sensitivity analysis. Section 7 concludes and discusses the policy implication.

## 2 Selective Literature Overview

### 2.1 Absolute Income, Relative Income, Income Inequality and Subjective Well-Being

Within country studies at any given point in time have typically found a positive correlation between absolute income and SWB (Diener, 1984; Easterlin, 1974, 1995). Helliwell et al. (2012) refer to this finding as a cross-sectional "fact".[6] They also note that the empirical relationship between SWB and absolute income is best portrayed by a linear logarithmic form, which implies that an extra dollar increases the satisfaction of a poor person by a much greater extent than it increases the satisfaction of a richer person. In this vein, Easterlin (1995) argues that absolute income matters up to a certain level, after which relative income increasingly matters. In support, some studies have observed that the size of the coefficient on absolute income becomes smaller in the presence of the relative income variable (e.g., Caporale et al., 2009; Knight & Gunatilaka, 2022). An extreme finding is that obtained by Banerjee et al. (2021) in their study on North Macedonia: when absolute income and relative income variables are included together in the regression equation, the association between SWB and absolute income disappears.

There is no consensus on the direction of the influence of reference/relative income on SWB. Empirical studies have found both positive and negative effects (Brown et al., 2015; Ngamaba et al., 2018). The negative effect likely signifies feelings of relative achievement or relative deprivation compared with others in the reference group, whereas the positive effect is seen as evidence of individuals using relative income as information to form expectations about their own future prospects (Hirschman & Rothschild, 1973). The findings are sensitive to the definition of the reference group, measure of reference group income, and the country context. Reference group is sometimes defined based on individual characteristics ("people like you") and sometimes defined spatially ("people near you").

[5] This is in line with the findings of Ferrer-i-Carbonell and Frijters (2004) and several other studies (e.g., Blanchflower and Oswald, 2004; Clark and Senik, 2010; Ding et al., 2021; Headey et al., 2008; Jantsch et al., 2022; Jiang et al., 2012; Knight et al., 2009; Knight and Gunatilaka, 2022; Noll and Weick, 2015; Senik, 2008; and Wang et al., 2015). See Sect. 4 on the empirical framework.

[6] The positive impact of absolute income on subjective well-being is attributed to the functional properties of income: a means to obtaining goods and services that are need-fulfilling; a source of status, self-esteem and anticipatory emotions; and a resource that buffers against major life events (Goldsmith, 2009).

In the "people like you" approach, reference group income is measured as the predicted income of people with similar characteristics, using regression equation of earnings (e.g., Clark & Oswald, 1996; Senik, 2004), or is calculated as the cell average of income for a specified set of characteristics (e.g., Ferrer-i-Carbonell, 2005; Kingdon & Knight, 2007).[7] In the "people near you" approach, reference group income is measured by the average income of a given geographical location which may be large or small, the choice being dictated by the nature of the available data. Knight and Gunatilaka (2022) note that it is rare for the two approaches to be combined. Since misspecification of the reference group may introduce noise or bias into the measures of the reference levels, another approach, when data permits, has been to define the reference group by asking people who they compare themselves to (Knight & Gunatilaka, 2022; Knight et al., 2009).

Notable studies that have obtained a negative relationship when reference income is based on predicted income or cell average income of those with similar characteristics include Brown et al. (2015) and Clark and Oswald (1996) for the UK, McBride (2001) for USA, and Ferrer-i-Carbonell (2005) for Germany. However, measuring reference group income in a similar manner, Senik (2004) obtained a positive relationship for Russia. Caporale et al. (2009) and Senik (2008) found an east–west divide in the impact of relative income on SWB: the relationship was negative in the case of "Western" European countries but positive in the case of Eastern European and Baltic countries. Senik (2008) also obtained a positive relationship for the USA using pooled GSS data for the period 1972–2001.

Brown et al. (2015) found that the sign and significance of reference income when the reference group was defined spatially were opposite to the pattern observed when the reference group was based on individual characteristics: the estimated effects under the spatial definition were positive with the significance of the coefficient varying by the estimation method of the regression equation. Measuring reference income as the mean income of the region in his study on Russia, Goldsmith (2009) obtained a positive but statistically insignificant coefficient. The coefficient on mean regional income was positive and significant only when consumption variables were present. Knight and Gunatilaka (2022) argue that studies which have failed to identify a comparator income effect on happiness are open to criticism that an inappropriate comparator group may have been examined.

A few studies show that the SWB of individuals is influenced by the rank order of their income within the predefined reference set or by whether their income was above or below the reference group average income. Drawing on data from the U.K.'s Workplace Employee Relations Survey for 1997–1998, Brown et al. (2008) found that the individual worker's position in the pay ordering had a significant positive effect on SWB. Using data collected in 2006 by the China General Social Survey, Wang et al. (2015) found that SWB was significantly higher if individual income was above the average income of the district. Knight and Gunatilaka (2022) too found that in rural and urban China SWB was positively affected if income was above the village or city/town average. However, they also observed that it was negatively affected by income below the village or city/town average. The positive impact had a larger coefficient than the negative impact coefficient. In

[7] The cell mean approach to measuring the reference group is more common in the literature. Ten out of the 15 studies reviewed by Goldsmith (2009, Table 4.2) follow the cell mean approach. As Goldsmith (2009) points out, cell mean approaches have tended to use fewer dimensions to define the reference group. For example, McBride (2001) and Caporale et al. (2009) define the reference group as all individuals who are in the age range of 5 years younger and 5 years older than the individual concerned. The consumption-related studies on SWB (Wang et al., 2019 and Wu, 2020) and wealth-related studies on SWB (Brown and Gray, 2016 and Jantsch et al., 2022) also favor the cell mean approach to defining the reference group.

contrast, Ferrer-i-Carbonell (2005) for West Germany found an asymmetric effect: those with income above that of the reference group did not experience a positive impact on SWB while those with income below the reference group average had a significant negative impact. The estimated effects of the reference income variables on SWB in East Germany were not significant.

Research findings on the influence of community-centered income inequality on SWB are mixed. The studies reviewed by Clark and D'Ambrosio (2015) and Schneider (2016) show a negative relationship in about one half of the studies, and a positive effect or no significant effect in the other one half of the studies. A negative relationship is explained in terms of individuals having egalitarian preference for or aversion to income inequality, while a positive relationship is interpreted as individuals considering inequality as a signal for future advancement rather than as an undesirable feature (Knight et al., 2009; Senik, 2009).

Results on the impact of community-centered income inequality on SWB are influenced by the selection of the inequality measure, the type of income used for its calculation and the size of the geographic unit (Schneider, 2016). The Gini coefficient is the most popular indicator used to study the link between income inequality and SWB. Schneider (2016) has argued that its use may not always be justified, and other inequality indicators may be more efficacious. Since the Gini coefficient reflects inequalities within the middle ranges, its use may not be appropriate if income polarization is an issue for individuals. In such instances, other indicators such as ratios of income in different percentiles may be more appropriate. In their study on the United States, Blanchflower and Oswald (2003) measured income inequality by the p75/p25 ratio and obtained a significant negative effect. Clark (2003) for the Great Britain measured inequality in terms of both the Gini coefficient and the p90/p10 ratio. He obtained a significant positive effect for the Gini coefficient and indicated (without reporting the actual result) that the finding on the p90/p10 was similar. Comparison of the effects of different measures of income inequality on SWB is rare.[8]

There are cross-country and within-country variations on the effects of community-centered income inequality on SWB. Recent studies on China reveal some interesting contrasts. Knight et al. (2009), using China Household Income Project (CHIP) survey 2002 data, found that an increase in the Gini coefficient of income inequality at the county level raised happiness in rural areas. Based on the same data source, Jiang et al. (2012) also found a significant positive coefficient between city-level Gini coefficient and happiness. However, the CHIP 2013 survey data did not indicate a significant effect of Gini on SWB in either rural or urban areas (Knight & Gunatilaka, 2022). But the Theil measures of community income inequality had positive and significant coefficients, indicating sensitivity to both tails of the distribution. In contrast, using the 2006 Chinese General Social Science Survey data, Wang et al (2015) found an inverted U-shaped association between the Gini index and SWB in both urban and rural areas. Based on the 2015 Chinese General Social Survey, Ding et al. (2021) obtained a negative relationship in rural China and an inverted U-shaped relationship in urban areas.

In sum, the empirical literature has examined the impact of own absolute income, relative income and income inequality on SWB, but the impact of all these three indicators have not been considered at the same time. The findings are mixed, depending on the definition of the reference group, how relative income and income inequality are measured and

[8] Knight and Gunatilaka (2022) is an exception.

the country context. While own income is generally positively correlated with SWB, there is no consensus on the direction of the impact of relative income and income inequality.

### 2.2 Consumption and Subjective Well-Being

Recent research has highlighted the importance of non-income measures of well-being. Choung et al. (2020) for Korea, Goldsmith (2009) for Russia, Headey et al. (2008) for Hungary and Wang et al. (2019) for China included income, consumption and wealth in a regression equation together with the standard controls and found that all these three variables had an independent positive effect on SWB. In a regression equation that included both income and consumption (but not wealth) and all the standard controls, Goldsmith (2009) for Russia and Noll and Weick (2015) for Germany found both variables to have a significant positive effect on SWB. However, Wu (2020) for Australia found that total consumption had no separate significant influence on SWB in the presence of income which had a positive significant effect. But, when consumption was disaggregated into conspicuous and basic consumption and was included in the regression equation with income, the coefficient on conspicuous consumption was positive and significant and income no longer had any significant effect.

Empirical studies also indicate that the content of the consumption basket matters for SWB. The impact on SWB is stronger for consumption of conspicuous goods and services that are visible to others. Choung et al. (2020) for Korea and Wu (2020) for Australia grouped the structure of consumption broadly into basic and conspicuous consumption and found a positive significant relationship between conspicuous consumption and SWB. The coefficient for basic consumption was negative in both studies, though statistically insignificant for the Australian sample. Choung et al. (2020) for Korea, Noll and Weick (2015) for Germany and Wang et al. (2019) for China disaggregated consumption expenditure into detailed categories and found that expenditure on leisure activities was positively correlated with SWB, and expenditure on healthcare was negatively correlated. Noll and Weick (2015) and Wang et al. (2019) found a positive effect of expenditure on clothing, but this expenditure category had no significant effect in the Korean sample. Noll and Weick (2015) observed a positive relationship between expenditure on education and SWB in Germany, but in the Korean sample of Choung et al. (2020) and Chinese sample of Wang et al. (2019) education expenditure had no significant effect.

The evidence on the influence of relative consumption on SWB is limited, given the dearth of studies that have looked into this issue. Choung et al. (2020) and Noll and Weick (2015) did not examine the role of relative consumption. Goldsmith (2009) for Russia examined the role of reference effects by estimating a regression equation that included mean income of region, mean consumption of region, household income and household consumption as explanatory variables. He found that both household income and household consumption had a positive significant effect on SWB. Mean income of region also had a positive significant coefficient indicating that this measure functioned as a signal for future prospects. In contrast, mean consumption of region had a negative and significant coefficient, indicating that higher reference group consumption lowered SWB through the traditional comparison effect.

Wang et al. (2019) too found that reference group consumption had a negative effect on SWB in China. They included household consumption and cell average consumption (viz., average consumption of the gender-age-education reference group) in the regression equation and obtained a positive relationship for own consumption and a negative relationship

for reference consumption.[9] In an alternative specification, Wang et al. (2019) included cell average reference consumption and rank order of an individual's consumption within the relevant reference group simultaneously with the level of household consumption and other controls, and found that only cell average reference consumption was significant with a negative sign. Neither the level of consumption nor rank order of consumption exerted any significant effect.

Wu (2020) found that the effect of conspicuous consumption on SWB in Australia took place mainly through social comparisons. When the ranking of conspicuous consumption expenditure within the reference group was included in the regression equation in addition to the level of conspicuous consumption, the ranking of conspicuous consumption had a significant positive effect but the effect of the level of conspicuous consumption was no longer significant. The level of income and ranking of income in the reference group were also included in the specification but they had no significant effect on SWB.

In sum, empirical studies indicate that consumption has a positive effect on SWB, independent of the effect of income, and that the impact is stronger for consumption of conspicuous goods and services that are visible to others. The evidence is tilted towards reference group consumption having a negative effect on SWB.

### 2.3 Wealth and Subjective Well-Being

The few studies that have empirically investigated the effects of wealth and income on SWB simultaneously found that both variables have a positive significant effect (e.g., Brokešová et al., 2021; Brown & Gray, 2016; Headey & Wooden, 2004; Headey et al., 2008; Knight & Gunatilaka, 2022). Headey and Wooden (2004) for Australia, and Headey et al. (2008) for Australia, Germany, the United Kingdom, and Hungary observed that wealth (net worth) had a stronger effect than income.[10] Researchers have highlighted the importance of separating net wealth into its constituent parts because of their different effects on subjective well-being. Brokešová et al. (2021), Brown and Gray (2016), Goldsmith (2009), Jantsch et al. (2024) and Plagnol (2011) found that assets had a positive significant effect while debt had a negative significant effect.

Brown and Gray (2016) for Australia and Jantsch et al. (2024) for Germany examined the importance of relative wealth and relative income for SWB simultaneously and obtained contrasting results. Brown and Gray (2016) found that whereas average level of income of reference group was negatively related to SWB, the average level of net wealth or total assets of reference group was positively related. The average level of debt of the reference group did not have a significant impact. Brown and Gray (2016) explained these findings by suggesting that individuals are more likely to compare themselves with assets of the reference group as these are more conspicuous while household debt of comparators are harder to observe directly. In contrast to Brown and Gray's findings, Jantsch et al. (2024) found that reference group income, reference group wealth and reference group debt did not have any significant effect on SWB in Germany.

Both Brown and Gray (2016) and Jantsch et al. (2024) also checked for asymmetries in comparisons by taking into account whether individuals were below or above the reference

[9] The regression equation also included household per capita income and other standard controls as explanatory variables.

[10] The regression equation for Hungary also included level of consumption as an explanatory variable, and the effect of consumption was found to be stronger than wealth and income.

group's income, total assets, and total debt. Brown and Gray (2016) found that having a level of household income above (below) that of the comparison group had positive (negative) effects on an individual's level of SWB. In contrast, having a level of net wealth above the average of the reference group had a negative impact, whereas having net wealth below the average of the reference group had a positive association. Separation of net wealth into total assets and debt reveals that this relationship was driven by the average level of total assets of the comparison group, rather than debt levels. According to Brown and Gray (2016), the negative effect of having net wealth above the average of the comparison group likely indicates an individual's dislike of inequality in net wealth and total assets. In contrast, Jantsch et al. (2024) found that having assets above the average of the reference group had a significant positive effect on subjective well-being, but none of the other comparisons vis-à-vis the reference group average had any significant effect.

In sum, empirical investigation confirms that wealth has an independent effect on SWB, and that the constituent parts of wealth have different effects. Also, the relative position of an individual's wealth above or below the average of the reference group has an asymmetric effect on SWB.

## 3 Data

We use data from the Slovak Household Finance and Consumption Survey (HFCS) conducted in 2017, which at the time of embarking on this paper was the latest wave available for research.[11] The sample of 2179 households is representative at the level of eight NUTS-3 regions.[12] The questionnaire contained questions about the detailed structure of assets, liabilities, consumption of households, various socio-economic characteristics of the household, and the gender, labor force status and marital status of the reference person filling in the questionnaire. The reference person was also asked about his/her general satisfaction with life on a scale from 0 to 10, where zero means completely dissatisfied. The structure of the data is unique, where information on subjective well-being is observed together with income, wealth, consumption and their sub-components. Descriptive statistics of the variables used in the analysis are reported in Appendix Tables 10 and 11.[13]

The HFCS data were processed and edited to remove any errors and inconsistencies. There were no missing observations in the estimation of the regression equations. There were no cases where information on demographic characteristics were missing. In cases where information was missing for key variables related to assets, liabilities, consumption and income, correction for missing answers was made by imputing the missing values using a well-established state-of-the art methodology that entailed multiple imputations by chained equations. The procedure is discussed in detail in Chapter 6 of Household Finance

[11] The Slovak HFCS data is collected by the National Bank of Slovakia in cooperation with the Statistical Office of the Slovak Republic. The HFCS is run about every three to four years since 2010 in the whole Eurosystem and a few additional countries, as part of a ECB research network (see, https://www.ecb.europa.eu/stats/ecb_surveys/hfcs/html/index.en.html). The most recent wave was conducted in 2021. The survey responses in the 2021 wave is likely to have been impacted by the Covid-19 pandemic shock, increase in property prices, and changes to credit policy (see Cupák et al., 2023). As such, analysis of SWB using the 2021 HFCS data is beyond the scope of this paper and is the subject of future research.

[12] For a discussion of the NUTS classification (Nomenclature of Territorial Units for Statistics), see https://ec.europa.eu/eurostat/web/nuts/background.

[13] Table 10 also reports the codes of the variables in the questionnaire and whether the variables were continuous or categorical.

and Consumption Network (2020). As a result, the final dataset contains data with five implicates. We take this feature of the dataset into account throughout the whole analysis and adjust our point estimates and standard errors following the standard procedures for multiple-imputed data suggested by Rubin (2004).

## 4 Empirical Framework

The empirical analysis in this paper combines the different approaches to examining the determinants of SWB discussed in Sect. 2 on literature overview. The basic objective is to examine the impact of income, consumption, and wealth on SWB simultaneously. In addition, the specification is enhanced by the inclusion of both self-centered inequality and community-centered inequality.

Our baseline specification is as follows.

$$SWB_i = \alpha_0 + Y'_i\beta + W'_i\gamma + C'_i\delta + X'_i\theta + H'\kappa + \rho_j + \varepsilon_i \quad (1)$$

Subjective well-being (*SWB*) is linked to indicators of economic well-being (*EWB*), such as components of gross income (vector *Y*), components of net wealth (vector *W*), and components of consumption (vector *C*), where *i* indexes the reference person of the household. All *EWB* indicators are expressed in natural logarithms of household totals divided by the number of household members. In several equations, the explanatory variables include both absolute and relative measures of the EWB indicators. It should be noted in this context that in a logarithmic specification the inclusion of the logarithm of the absolute measure of the EWB indicator and the logarithm of the reference measure of the EWB indicator is equivalent to the inclusion of Ln(absolute measure of the EWB indicator) and Ln(absolute measure of the EWB indicator/reference measure of the EWB indicator). Only the size of the coefficients will be different, and this should be borne in mind when interpreting the results.[14]

In line with earlier studies discussed in the literature review, additional control variables are included in the specification, such as individual characteristics of the reference person in the household (*X*), household characteristics (*H*), and subregional dummies ($\rho_j$). Individual characteristics are age, age-squared, and a list of categorical variables for gender, highest education level attained, labor market status and marital status. Household characteristics are a dummy variable for the presence of children in the household and an indicator of the degree of urbanization in the neighborhood of main residence. Subregional dummies correspond to the sixteen subregions defined by the Slovak Institute of Employment.[15] The last term in Eq. (1), $\varepsilon_i$ are i.i.d. normal disturbances.

[14] As a robustness check, we tried adopting the so-called OECD-modified equivalence scale to adjust for household size throughout the analysis. This approach weights household head by 1, each additional adult member by 0.5 and each child by 0.3. The empirical results using the equivalence scale are similar to that obtained by not using an equivalence scale. The results using the equivalence scale are available from the authors upon request.

[15] Subregions can be seen as an intermediate step between the eight regions of NUTS-3 and 79 districts of Slovakia. The Institute of Employment (a Slovak NGO) defined sixteen subregions grouping socio-economically and geographically similar districts into relatively homogenous units. Some subregions cross the borders of official NUTS-3 regions. Their definition is a well-known alternative to the official regional classification in Slovakia. https://www.iz.sk/en/projects/regions-of-slovakia.

The rationale for the inclusion of these additional control variables is discussed in the various survey articles cited in footnote 2 in the Introduction section. It should be noted that redistribution or social services accessibility is not included as a control variable. Their influence is likely captured by the inclusion of subregional dummies in the specification. Such a justification was also provided by Knight et al. (2009). They included 21 provincial dummies in the SWB regression for rural China as a "community" variable, and considered the provincial dummies as proxy for the extent of government funding of public services and infrastructure, and unobserved province characteristics such as environment, culture, and quality of governance. In similar fashion, Alesina et al. (2004) included dummy variables for individual states in the United States and for countries in Europe. It should also be noted that the inclusion of subregional dummies in the regression equation likely addresses the issue of regional differences in consumer prices.[16]

In alternative versions of the baseline specification, we disaggregate income, consumption and wealth into subcomponents. Income is disaggregated into labor income, transfers and other income. Total consumption split into conspicuous and non-conspicuous components. The former includes expenditure on holidays and eating outside of home, while non-conspicuous consumption is all other categories of consumption. The above division is driven by data availability. Net wealth is separated into gross assets and gross liabilities. The coefficients on all the *EWB* indicators, except for gross liabilities, are expected to have a positive sign.

The discussion of the results in the paper is based on OLS estimates. Economists generally treat the SWB variable to be ordinal and consider that ideally an ordered latent response model should be used for the analysis of this variable. Thus, many notable studies have estimated ordered logit/ordered probit models of SWB (e.g., Alesina et al., 2004; Blanchflower & Oswald, 2004; Caporale et al., 2009; McBride, 2001; and Senik, 2004). However, in a widely cited methodological paper, Ferrer-i-Carbonell and Frijters (2004) found that "results for the … ordered logit model are surprisingly close to the results of a simple OLS on the changes in general satisfaction".[17] In recent periods, an increasing number of studies on SWB discuss their findings based on OLS regression estimates since robustness tests in these studies show that, in line with the finding of Ferrer-i-Carbonell and Frijters (2004), the significance and sign of the estimated coefficients for both OLS and ordered probit/ordered logit regression models were very similar (e.g., Clark & Senik, 2010; Ding et al., 2021; Headey et al., 2008; Jantsch et al., 2024; Jiang et al., 2012; Knight et al., 2009; Knight & Gunatilaka, 2022; Senik, 2008; and Wang et al., 2015). In this paper, we estimate the equations for the above baseline specification using both OLS and ordered logit and find that the results are very similar (see Tables 1 and 2). Hence, the OLS method is preferred for the analysis of the results because of the ease of interpretation. The statistical significance of the OLS estimates are determined on the basis of bootstrapped standard errors, in order to take into account the multiple-imputed nature of the data. The values of the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) are presented in the tables together with Adjusted R-squared as measures of the quality of the model.

[16] It is not possible to directly take into account regional differences in price level in the measurement of consumption because data on regional consumer price index are not available for Slovakia.

[17] Ferrer-i-Carbonell and Frijters (2004), page 642. It is also notable that although Blanchflower and Oswald (2004) carry out the analysis in their paper using the ordered logit model, they point out in footnote 7 and in Appendix A that "the simple method gives similar results to those from ordered logits".

Multicollinearity among explanatory variables is not a cause for concern in our study. The existence of multicollinearity is assessed in two alternative ways. The pairwise correlations between the explanatory variables shown in Appendix Table 12 indicate that there are no critically high cross-correlations. In addition to inspecting the correlation matrix, we also compute the variance inflation factor (VIF) for each explanatory variable. Generally, researchers consider VIF value greater than 5 to be indicative of multicollinearity (e.g., James et al., 2013), though Johnston et al. (2018) suggests that a more conservative threshold of 2.5 should be the norm. As Appendix Table 13 shows, the VIFs of all the explanatory variables except for labor income are below 2.5 while those of labor income are below 3, indicating that collinearity is not a problem in our empirical exercise.

A limitation of the estimation of the regression equations in this paper, like that of many other cross-section studies on SWB (e.g., Choung et al., 2020), is that the issue of potential endogeneity of the self-centered inequality variables is not addressed.The main reason for this is that valid instruments are difficult to find.[18] Also, because of the snap-shot nature of the survey data, the covariates could not be specified with a one period lag to address the endogeneity issue.

In the next part of the analysis, we expand the baseline specification by including self-centered inequality and community-centered inequality, following Knight and Gunatilaka (2022). Thus:

$$SWB_i = \beta_0 + \beta_1 SCI_i^e + \beta_2 CCI_i^e + EWB'_i\lambda + X'_i\mu + H'_i\pi + \varrho_j + \upsilon_i \tag{2}$$

Self-centered inequality ($SCI^e$) aims to compare the individual with a reference group in terms of *EWB* indicator $e \in \{Y, W, C\}$.[19] We use cell means by age-education-region groups (as in Ferrer-i-Carbonell, 2005; Kingdon & Knight, 2007), where cells are defined by eight NUTS-3 regions, three age categories and two education categories of respondents.[20] As noted earlier, the cell mean approach to measuring the reference group is more common in the literature. A further narrowing of the reference group was not feasible due to limited subsample sizes of the resulting cells. We check the sensitivity of results to using other standard *SCI* measures found in the literature,[21] all of which are based on broader, regional reference groups.

Community-centered inequality ($CCI^e$) focuses on overall inequality in the broader, spatially defined reference group rather than on the position of the household within the group. These are standard inequality measures computed for each of the eight NUTS-3 regions, such as the Gini coefficient or different inter-percentile ratios of the 90th, 50th and the 10th percentiles of *EWB* indicator $e \in \{Y, W, C\}$.

Given the mixed empirical evidence in the literature, the expected signs of coefficients on $SCI^e$ and $CCI^e$ are ambiguous. As noted in the literature review section, a negative coefficient is associated with the envy effect, whereas a positive coefficient is in line with the signaling or information effect, suggesting that higher inequality in the reference group signals better future opportunities and *SWB* for individuals.

[18] This argument is also mentioned in Knight and Gunatilaka (2022) as a reason for why the potential endogeneity problem is not addressed in most cross-section studies on SWB.

[19] In earlier studies, *SCI* was also called relative measure of *EWB*.

[20] See Tables 14 and 15 in the Appendix for descriptive statistics by cells.

[21] Such as regional means and percentiles, predicted values of *EWB* based on a first-stage model, and regional ranks.

## 5 Results

Tables 1 and 2 report the OLS and ordered logit estimates, respectively, of eight alternative specifications of Eq. (1) in which income, consumption and wealth are included individually and concurrently together with the control variables noted in Sect. 4. As already noted above, the estimates of the OLS and ordered logit models are similar in terms of both the signs and statistical significance. Hence, in the discussion that follows we focus on the results of the OLS regressions.

Column 1 represents the baseline specification with natural logarithm of per capita household income by itself and the standard control variables. In column 2 we introduce household income and consumption, and in column 3 we augment household income with wealth. In column 4, we include income, consumption, and wealth simultaneously to allow for their separate effects. The full set of estimates including all control variables can be found in Table 16

**Table 1** Life satisfaction and economic well-being (OLS estimates)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Income | 0.439*** | 0.334*** | 0.316*** | 0.269*** | | 0.239*** | 0.248*** | |
| | (0.095) | (0.089) | (0.088) | (0.086) | | (0.082) | (0.084) | |
| Labor income | | | | | 0.045** | | | 0.011 |
| | | | | | (0.020) | | | (0.020) |
| Transfer income | | | | | 0.012 | | | 0.010 |
| | | | | | (0.023) | | | (0.022) |
| Other income | | | | | 0.041* | | | 0.057*** |
| | | | | | (0.023) | | | (0.021) |
| Consumption | | 0.528*** | | 0.278* | 0.377*** | | 0.364*** | |
| | | (0.138) | | (0.143) | (0.143) | | (0.137) | |
| Conspicuous cons | | | | | | 0.077*** | | 0.081*** |
| | | | | | | (0.021) | | (0.021) |
| Other cons | | | | | | 0.122 | | 0.269** |
| | | | | | | (0.134) | | (0.135) |
| Net wealth | | | 0.973*** | 0.911*** | 0.917*** | 0.900*** | | |
| | | | (0.150) | (0.144) | (0.147) | (0.144) | | |
| Total assets | | | | | | | 0.185*** | 0.183*** |
| | | | | | | | (0.027) | (0.026) |
| Total liabilities | | | | | | | −0.022 | −0.019 |
| | | | | | | | (0.014) | (0.014) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.1881 | 0.1964 | 0.2230 | 0.2249 | 0.2231 | 0.2292 | 0.2220 | 0.2233 |
| AIC | 8729 | 8708 | 8634 | 8630 | 8637 | 8619 | 8639 | 8638 |
| BIC | 8905 | 8890 | 8816 | 8817 | 8836 | 8812 | 8832 | 8849 |
| Observations | 2179 | 2179 | 2179 | 2179 | 2179 | 2179 | 2179 | 2179 |

All explanatory variables listed are measured in logarithms of per capita values. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels. Bootstrapped standard errors are reported in parentheses. A constant was included in all specifications. Control variables are: age, age-squared; categories of gender, education, labor market status, marital status, presence of children in the household, degree of urbanization; and subregional dummies. AIC and BIC are the Akaike and Bayesian information criteria, respectively

**Table 2** Life satisfaction and economic well-being (Ordered logit estimates)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Income | 0.508*** | 0.375*** | 0.341*** | 0.286*** | | 0.241** | 0.272*** | |
| | (0.115) | (0.108) | (0.107) | (0.105) | | (0.099) | (0.102) | |
| Labor income | | | | | 0.050** | | | 0.013 |
| | | | | | (0.022) | | | (0.022) |
| Transfer income | | | | | 0.017 | | | 0.014 |
| | | | | | (0.026) | | | (0.025) |
| Other income | | | | | 0.041 | | | 0.062** |
| | | | | | (0.026) | | | (0.025) |
| Consumption | | 0.549*** | | 0.288* | 0.389** | | 0.398** | |
| | | (0.159) | | (0.161) | (0.162) | | (0.157) | |
| Conspicuous cons | | | | | | 0.089*** | | 0.091*** |
| | | | | | | (0.025) | | (0.025) |
| Other cons | | | | | | 0.132 | | 0.311** |
| | | | | | | (0.141) | | (0.145) |
| Net wealth | | | 1.083*** | 1.013*** | 1.019*** | 1.005*** | | |
| | | | (0.158) | (0.156) | (0.157) | (0.156) | | |
| Total assets | | | | | | | 0.192*** | 0.186*** |
| | | | | | | | (0.030) | (0.029) |
| Total liabilities | | | | | | | −0.025 | −0.022 |
| | | | | | | | (0.016) | (0.016) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Pseudo-R-squared | 0.0579 | 0.0606 | 0.0694 | 0.0701 | 0.0699 | 0.0720 | 0.0688 | 0.0700 |
| AIC | 7066934 | 7046594 | 6980606 | 6975294 | 6976720 | 6960961 | 6985149 | 6976008 |
| BIC | 7067161 | 7046827 | 6980839 | 6975533 | 6976970 | 6961206 | 6985394 | 6976269 |
| Observations | 2179 | 2179 | 2179 | 2179 | 2179 | 2179 | 2179 | 2179 |

All explanatory variables listed are measured in logarithms of per capita values. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels. Bootstrapped standard errors are reported in parentheses. A constant was included in all specifications. Control variables are: age, age-squared; categories of gender, education, labor market status, marital status, presence of children in the household, degree of urbanization; and subregional dummies. AIC and BIC are the Akaike and Bayesian information criteria, respectively

in the Appendix.[22] In column 5 of Table 1 income is divided into labor income, transfers and other income to test the hypothesis that the three channels have different impact on SWB (Goldsmith, 2009). In column 6, consumption is disaggregated into conspicuous and other consumption to test the hypothesis that the consumption of goods and services that are visible to others has a stronger association with happiness than the rest of consumption (Wang et al., 2019). Similarly, in column 7 net wealth is separated into gross assets and gross liabilities to test the hypothesis that these subcomponents have different effects on SWB (Brokešová et al., 2021; Brown & Gray, 2016; Goldsmith, 2009; Jantsch et al., 2024). In column 8 all the economic well-being indicators are included in disaggregate form.

[22] The estimates for the individual- and household-specific characteristics do not change considerably for alternative specifications considered in this paper and are broadly in line with other studies. Hence, we do not discuss the findings on the control variables in detail.

**Table 3** Life satisfaction and community-centered inequality in income (OLS estimates)

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Income | 0.257*** | 0.267*** | 0.248*** | 0.245*** |
| | (0.088) | (0.087) | (0.087) | (0.086) |
| Consumption | 0.271** | 0.254* | 0.287** | 0.296** |
| | (0.136) | (0.142) | (0.140) | (0.142) |
| Net wealth | 0.882*** | 0.900*** | 0.896*** | 0.897*** |
| | (0.145) | (0.148) | (0.141) | (0.146) |
| SCI in income: | | | | |
| Cell means | 0.422* | 0.326 | 0.482** | 0.343 |
| | (0.221) | (0.220) | (0.221) | (0.219) |
| CCI in income: | | | | |
| Regional p90/p10 | 1.057*** | | | |
| | (0.281) | | | |
| Regional p90/p50 | | 1.938* | | |
| | | (1.021) | | |
| Regional p50/p10 | | | 1.830*** | |
| | | | (0.684) | |
| Regional Gini | | | | 9.329*** |
| | | | | (2.704) |
| Control variables | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.2376 | 0.2311 | 0.2314 | 0.2332 |
| AIC | 8596 | 8614 | 8613 | 8608 |
| BIC | 8759 | 8813 | 8812 | 8807 |
| Observations | 2179 | 2179 | 2179 | 2179 |

Income, consumption, net wealth, and cell means in income are measured in logarithms of per capita values. CCI in income are expressed as ratios of per capita values. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels. Bootstrapped standard errors are reported in parentheses. A constant was included in all specifications. Control variables are the same as in Table 1, see note under the table. AIC and BIC are the Akaike and Bayesian information criteria, respectively

The results support the earlier findings of Choung et al. (2020), Goldsmith (2009) and Headey et al. (2008) that income, consumption and wealth each has a significant positive effect on SWB. Even though the size of its coefficient falls somewhat, income retains a sizeable and significant effect on SWB when consumption and wealth are included as covariates in the specifications. The coefficients on consumption and wealth are also positive and significant, and the explanatory power of the equation increases when these two measures of well-being are included in the specifications together with income. As Goldsmith (2009) argues, the evidence is consistent with the view that each of these variables affect SWB through status, self-esteem, and anticipation channels.[23]

The results in column 5 indicate that labor income and other income have similar influence on SWB, but the effect of transfer income is smaller. In other words, unlike Ziogas et al. (2023), we do not find evidence of a negative, stigmatizing effect of income derived

[23] It should be pointed out that this is a conjecture as we lack relevant data to directly test psycho-social hypotheses.

**Table 4** Life satisfaction and community-centered inequality in consumption (OLS estimates)

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Income | 0.261*** | 0.264*** | 0.260*** | 0.263*** |
| | (0.086) | (0.085) | (0.087) | (0.085) |
| Consumption | 0.275* | 0.269* | 0.254* | 0.250* |
| | (0.143) | (0.146) | (0.143) | (0.146) |
| Net wealth | 0.877*** | 0.892*** | 0.894*** | 0.909*** |
| | (0.149) | (0.151) | (0.150) | (0.149) |
| SCI in consumption: | | | | |
| Cell means | 0.582 | 0.639 | 0.667* | 0.700* |
| | (0.401) | (0.399) | (0.401) | (0.412) |
| CCI in consumption: | | | | |
| Regional p90/p10 | − 1.927*** | | | |
| | (0.454) | | | |
| Regional p90/p50 | | − 3.092 | | |
| | | (2.178) | | |
| Regional p50/p10 | | | − 3.825*** | |
| | | | (0.971) | |
| Regional Gini | | | | − 1.197 |
| | | | | (12.503) |
| Control variables | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.2370 | 0.2284 | 0.2368 | 0.2264 |
| AIC | 8597 | 8622 | 8598 | 8627 |
| BIC | 8796 | 8821 | 8797 | 8826 |
| Observations | 2179 | 2179 | 2179 | 2179 |

Income, consumption, net wealth, and cell means in consumption are measured in logarithms of per capita values. CCI in consumption are expressed as ratios of per capita values. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels. Bootstrapped standard errors are reported in parentheses. A constant was included in all specifications. Control variables are the same as in Table 1 (see note below the table). AIC and BIC are the Akaike and Bayesian information criteria, respectively

from social transfers on SWB. Column 6 shows that the structure of the consumption basket matters for SWB. Consistent with the hypothesis posited above and the findings of previous research, conspicuous consumption expenditure has a significant positive effect on SWB. However, while the coefficient on other consumption expenditure is also positive, it is not statistically significant. Column 7 shows that assets and liabilities have opposite effects on SWB, and that the positive effect of assets has a greater impact than the negative effect of liabilities. The coefficient on gross assets is positive and significant while the coefficient on gross liabilities is negative but not statistically significant. This is contrary to the findings of studies by Brown and Gray (2016), Goldsmith (2009) and Jantsch et al. (2024) who obtained a positive significant effect of assets and a negative significant effect of debt. This difference could be attributed to differences in country context. A main component of assets of Slovak household is housing while gross liabilities mainly comprise mortgage debt. It is therefore highly likely that SWB of Slovak households is affected

**Table 5** Life satisfaction and community-centered inequality in net wealth (OLS estimates)

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Income | 0.266*** | 0.283*** | 0.265*** | 0.273*** |
| | (0.087) | (0.087) | (0.086) | (0.087) |
| Consumption | 0.299** | 0.265* | 0.297** | 0.305** |
| | (0.140) | (0.142) | (0.143) | (0.144) |
| Net wealth | 0.870*** | 0.873*** | 0.876*** | 0.862*** |
| | (0.142) | (0.147) | (0.143) | (0.147) |
| SCI in net wealth: | | | | |
| Cell means | 0.623 | 0.391 | 0.641 | 0.531 |
| | (0.432) | (0.449) | (0.431) | (0.434) |
| CCI in net wealth: | | | | |
| Regional p90/p10 | −0.011 | | | |
| | (0.010) | | | |
| Regional p90/p50 | | −0.534** | | |
| | | (0.239) | | |
| Regional p50/p10 | | | −0.022 | |
| | | | (0.028) | |
| Regional Gini | | | | −7.161* |
| | | | | (3.998) |
| Control variables | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.2291 | 0.2290 | 0.2270 | 0.2284 |
| AIC | 8620.0 | 8620.2 | 8625.9 | 8622.0 |
| BIC | 8819.0 | 8819.2 | 8825.0 | 8821.0 |
| Observations | 2179 | 2179 | 2179 | 2179 |

Income, consumption, net wealth, and cell means in net wealth are measured in logarithms of per capita values. CCI in net wealth are expressed as ratios of per capita values. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels. Bootstrapped standard errors are reported in parentheses. A constant was included in all specifications. Control variables are the same as in Table 1 (see note below the table). AIC and BIC are the Akaike and Bayesian information criteria, respectively

by the net value of housing rather than by individual components of wealth.[24] When all the subcomponents of the three economic well-being indicators are included together, the coefficient on labor income ceases to be significant while that on other (non-conspicuous) consumption becomes significant (column 8). It is notable that the size of the coefficients on aggregate measures of income, consumption, and wealth are larger than the sum of the coefficients on the respective components. This is perhaps indicative of the separate channels of influence being measured inaccurately.

Tables 3, 4 and 5 show the estimates of the expanded specification in Eq. (2) separately for the relationship between SWB and income, consumption, and wealth. In each of the separate regressions, measures of self-centered inequality (i.e., a reference group measure) and community-centered inequality in the relevant variable of interest (i.e., income,

[24] Jantsch et al. (2022, Table 4) for Germany found that non-mortgage debt mattered more for SWB than mortgage debt: the coefficient on mortgage debt was negative and statistically significant while the coefficient on mortgage debt was not statistically significant.

**Table 6** Life satisfaction and inequality in income, consumption, and net wealth (OLS estimates)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Income | 0.324*** | 0.314*** | 0.305*** | 0.312*** | 0.261*** | 0.257*** |
| | (0.086) | (0.090) | (0.087) | (0.090) | (0.083) | (0.087) |
| Consumption | 0.506*** | 0.509*** | | | 0.261* | 0.259* |
| | (0.144) | (0.140) | | | (0.150) | (0.147) |
| Net wealth | | | 0.960*** | 0.939*** | 0.899*** | 0.888*** |
| | | | (0.152) | (0.152) | (0.151) | (0.150) |
| SCI (cell means): | | | | | | |
| Income | 0.175 | 0.231 | 0.332 | 0.391 | 0.125 | 0.220 |
| | (0.368) | (0.369) | (0.266) | (0.277) | (0.403) | (0.403) |
| Consumption | 0.482 | 0.508 | | | 0.434 | 0.504 |
| | (0.672) | (0.696) | | | (0.715) | (0.728) |
| Net wealth | | | 0.261 | −0.033 | 0.231 | −0.101 |
| | | | (0.523) | (0.545) | (0.532) | (0.551) |
| Regional CCI: | | | | | | |
| Income p50/p10 | | 1.200 | | 1.860*** | | 1.235 |
| | | (0.750) | | (0.663) | | (0.753) |
| Consump. p50/p10 | | −3.388*** | | | | −2.796** |
| | | (1.102) | | | | (1.286) |
| Net wealth p90/p50 | | | | −0.556** | | −0.188 |
| | | | | (0.233) | | (0.269) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.1977 | 0.2108 | 0.2242 | 0.2327 | 0.2261 | 0.2376 |
| AIC | 8706 | 8672 | 8633 | 8611 | 8629 | 8600 |
| BIC | 8899 | 8877 | 8826 | 8815 | 8834 | 8821 |
| Observations | 2179 | 2179 | 2179 | 2179 | 2179 | 2179 |

Income, consumption, net wealth, and SCI (cell means) are measured in logarithms of per capita values. Regional CCI are expressed as ratios of per capita values. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels. Bootstrapped standard errors are reported in parentheses. A constant was included in all specifications. Control variables are the same as in Table 1 (see note below the table). AIC and BIC are the Akaike and Bayesian information criteria, respectively

consumption, or wealth) are added to the baseline specification shown in column 4 of Table 1. Self-centered inequality is measured by cell means of the variable of interest for the region-age-education reference group.[25] In the case of community-centered inequality we compare the results of specifications containing the regional Gini coefficient with those for regional percentile ratios derived from the 90th, 50th and the 10th percentile values (p90, p50, p10). While the Gini coefficient reflects inequalities within the middle ranges of the underlying distribution, percentile ratios give more weight to tails (see Clark, 2003; and Knight & Gunatilaka, 2022). With the exception of the study by Knight and Gunatilaka (2022), the inclusion of both self-centered inequality and community-centered inequality in the same specification is scarce in the literature. Also, to the best of our knowledge, our study is the first to compare the effects of self-centered inequality and community-centered inequality for all three EWB indicators $e \in \{Y, W, C\}$.

[25] In Sect. 6 we analyze the sensitivity of results for choosing other measures of self-centered inequality.

Regression estimates presented in Tables 3, 4 and 5 confirm that the positive and statistically significant effects of absolute measures of income, consumption, and wealth on SWB are robust to the inclusion of the inequality measures. Focusing on income inequality in Table 3, both self-centered and community-centered measures had a positive and statistically significant effect on SWB. The coefficients on reference group income, regional Gini index of income inequality and all the inter-percentile ratios for income are positive and statistically significant. This can be interpreted as evidence that individuals consider both reference group income and community-centered income inequality as a positive signal for future self-advancement rather than as an undesirable feature. A positive and statistically significant effect of reference group income is consistent with earlier findings of Caporale et al. (2009) and Senik (2004 and 2008) for Eastern European countries.

In contrast to the findings for income inequality, self-centered consumption inequality and community-centered consumption inequality exerted opposite influences on SWB. As Table 4 shows, the effect of self-centered consumption inequality was positive while that of community-centered consumption inequality was negative. Thus, in line with the common practice in the conventional literature, we can interpret this finding as one where reference group average consumption has a positive signaling effect for future prospects while community-centered consumption inequality is viewed as a local public „bad ". Among the various community-centered measures, the coefficient is statistically significant only for the p90/p10 and p50/p10 inter-percentile ratios, which suggests that the role of inequality on SWB is particularly dominant in the left tail of the distribution. The positive effect of self-centered consumption inequality in Slovakia is contrary to the negative effect observed by Goldsmith (2009) for Russia and Wang et al. (2019) for China, which can be attributed to differences in country context. To the best of our knowledge, there is no other study that examines the linkage between the community-centered inequality of consumption and SWB.

In the case of wealth also, the effects of self-centered wealth inequality and community-centered wealth inequality on SWB are different. As Table 5 shows, reference group wealth has no significant effect, consistent with the finding of Jantsch et al. (2024) for Germany, while all the different measures of community-centered wealth inequality have a negative association. However, only the coefficients on the Gini index and the p90/p10 inter-percentile ratio are statistically significant. This suggests that wealth polarization at any of the tails of the distribution does not stand out as the main driver of the association with SWB of individuals and that inequality within the middle ranges is just as relevant.

Table 6 presents the results of another extension of the model in which we examine the role of reference group measures and community-centered inequality for income, consumption and wealth simultaneously in the presence of the absolute values of these three variables. The results indicate that overall, the SWB of individuals is affected positively by absolute values of income, consumption, and wealth, and negatively by community-centered consumption inequality, especially at the lower tail of the distribution. The size and statistical significance of the coefficients on the absolute values of income, consumption and wealth are stable in all specifications, while the coefficients on the reference group measures remain insignificant. When community-centered inequality measures are added to the specification, consumption inequality measured by the p50/p10 interpercentile ratio is negative and statistically significant, but the community-centered income inequality and wealth inequality measures are significant only if consumption inequality is not included in the same specification (column 4).

In sum, we may conclude that, in accordance with the rest of the literature, own economic wellbeing is associated with higher life satisfaction. First, we add scarce evidence that each of income, consumption, and wealth affect SWB via their own channels.

Looking further into their subcomponents, the direct relationship is strongest for labor income, conspicuous consumption (e.g., holidays and eating out) and total assets. Second, as our main novelty, we compare a broad range of measures for reference group income, consumption, and wealth (with additional results in the next section). The results are, however, sensitive to the choice of these measures, based on which we conclude the presence of either the information effect or the envy effect.

## 6 Sensitivity Analysis

In this section we compare the sensitivity of results to using different measures of self-centered inequality for each of the EWB variables of interest. These measures include: regional median; the 75th percentile; predicted value based on regional and socio-economic characteristics of the reference person (similar to Welsch & Kühling, 2015); cell

**Table 7** Life satisfaction and self-centered inequality in income (OLS estimates)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Income | 0.269*** | 0.270*** | 0.213*** | 0.255*** | 0.134 | 0.033 |
| | (0.086) | (0.086) | (0.081) | (0.085) | (0.096) | (0.105) |
| Consumption | 0.279* | 0.276* | 0.132 | 0.275* | 0.210 | 0.181 |
| | (0.142) | (0.142) | (0.138) | (0.143) | (0.146) | (0.150) |
| Net wealth | 0.910*** | 0.908*** | 0.847*** | 0.910*** | 0.934*** | 0.906*** |
| | (0.144) | (0.144) | (0.143) | (0.145) | (0.146) | (0.142) |
| SCI in income: | | | | | | |
| Regional median | 0.204 | | | | | |
| | (1.138) | | | | | |
| Regional p75 income | | 0.922 | | | | |
| | | (1.135) | | | | |
| Predicted income | | | 4.129*** | | | |
| | | | (0.568) | | | |
| Cell means of income | | | | 0.399* | | |
| | | | | (0.219) | | |
| Income > = p75 | | | | | 0.014 | |
| | | | | | (0.158) | |
| Income < = p25 | | | | | −0.453*** | |
| | | | | | (0.159) | |
| Region. rank of income | | | | | | 0.924*** |
| | | | | | | (0.318) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.2246 | 0.2583 | 0.2263 | 0.2302 | 0.2252 | 0.2302 |
| AIC | 8632 | 8630 | 8535 | 8627 | 8617 | 8616 |
| BIC | 8825 | 8823 | 8728 | 8820 | 8816 | 8809 |
| Observations | 2179 | 2179 | 2179 | 2179 | 2179 | 2179 |

Income, consumption, net wealth, and SCI in income are measured in logarithms of per capita values. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels. Bootstrapped standard errors are reported in parentheses. A constant was included in all specifications. Control variables are the same as in Table 1, see note under the table. AIC and BIC are the Akaike and Bayesian information criteria, respectively

means by region-age-education categories (as in Ferrer-i-Carbonell, 2005; Kingdon & Knight, 2007); a pair of dummies for tails in the regional distribution, being equal to one if the value of the variable of interest is larger than the 75th or smaller than the 25th percentile, respectively (following Jantsch et al., 2024; and Knight & Gunatilaka, 2022); and regional ranks expressing the percentage of respondents in the region with a lower value of the variable of interest than the individual respondent (used, for example, in Wu, 2020).

Tables 7, 8 and 9 report the estimates for different measures of self-centered inequality separately for income, consumption and net wealth. In general, we can conclude that results vary both in terms of statistical significance and signs of the estimated coefficients; i.e., the estimates are sensitive to the choice of the self-centered inequality measure.

Looking at the alternative specifications for reference group income in Table 7, the results for cell mean income and predicted income of those with the same characteristics are mutually supportive (columns 3 and 4). Both measures have a positive and significant effect on SWB, a result which is commonly interpreted as evidence of demonstration effect and expectation of future

**Table 8** Life satisfaction and self-centered inequality in consumption (OLS estimates)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Income | 0.269*** | 0.266*** | 0.357*** | 0.263*** | 0.276*** | 0.270*** |
| | (0.086) | (0.086) | (0.134) | (0.084) | (0.087) | (0.086) |
| Consumption | 0.278* | 0.290** | 0.307** | 0.249* | 0.068 | 0.104 |
| | (0.142) | (0.141) | (0.147) | (0.144) | (0.244) | (0.370) |
| Net wealth | 0.911*** | 0.904*** | 1.008*** | 0.911*** | 0.924*** | 0.913*** |
| | (0.144) | (0.142) | (0.191) | (0.148) | (0.146) | (0.144) |
| SCI in consumption: | | | | | | |
| Regional median | −0.032 | | | | | |
| | (1.150) | | | | | |
| Regional p75 | | −2.926* | | | | |
| | | (1.506) | | | | |
| Predicted consumption | | | −0.501 | | | |
| | | | (0.555) | | | |
| Cell means | | | | 0.703* | | |
| | | | | (0.400) | | |
| Consumption > = p75 | | | | | 0.034 | |
| | | | | | (0.159) | |
| Consumption < = p25 | | | | | −0.252* | |
| | | | | | (0.151) | |
| Regional rank | | | | | | 0.284 |
| | | | | | | (0.530) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.2246 | 0.2250 | 0.2265 | 0.2256 | 0.2270 | 0.2248 |
| AIC | 8631.5 | 8624.9 | 8630.5 | 8626.2 | 8629.7 | 8631.2 |
| BIC | 8824.9 | 8818.3 | 8823.8 | 8819.5 | 8828.8 | 8824.5 |
| Observations | 2179 | 2179 | 2179 | 2179 | 2179 | 2179 |

Income, consumption, net wealth and SCI in consumption are measured in logarithms of per capita values. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels. Bootstrapped standard errors are reported in parentheses. A constant was included in all specifications. Control variables are the same as in Table 1 (see note below the table). AIC and BIC are the Akaike and Bayesian information criteria, respectively

**Table 9** Life satisfaction and self-centered inequality in net wealth (OLS estimates)

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Income | 0.276*** | 0.271*** | 0.269*** | 0.270*** | 0.259*** |
| | (0.086) | (0.086) | (0.086) | (0.085) | (0.083) |
| Consumption | 0.283** | 0.282** | 0.284** | 0.237* | 0.228* |
| | (0.141) | (0.143) | (0.143) | (0.140) | (0.138) |
| Net wealth | 0.884*** | 0.900*** | 0.881*** | 0.606*** | 0.255 |
| | (0.146) | (0.141) | (0.143) | (0.192) | (0.246) |
| SCI in net wealth: | | | | | |
| Regional median | 2.062** | | | | |
| | (0.821) | | | | |
| Regional p75 | | 2.036 | | | |
| | | (1.977) | | | |
| Cell means | | | 0.597 | | |
| | | | (0.431) | | |
| Net wealth > = p75 | | | | 0.321* | |
| | | | | (0.167) | |
| Net wealth < = p25 | | | | −0.211 | |
| | | | | (0.158) | |
| Regional rank | | | | | 1.278*** |
| | | | | | (0.361) |
| Control variables | Yes | Yes | Yes | Yes | Yes |
| Adjusted R-squared | 0.2295 | 0.2258 | 0.2278 | 0.2269 | 0.2322 |
| AIC | 8618 | 8625 | 8628 | 8624 | 8610 |
| BIC | 8811 | 8818 | 8822 | 8823 | 8803 |
| Observations | 2179 | 2179 | 2179 | 2179 | 2179 |

Income, consumption, net wealth and SCI in net wealth are measured in logarithms of per capita values. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels. Bootstrapped standard errors are reported in parentheses. A constant was included in all specifications. Control variables are the same as in Table 1 (see note below the table). AIC and BIC are the Akaike and Bayesian information criteria, respectively

prospects. However, there is no significant impact of reference group income on SWB when it is measured spatially by the regional median or regional 75th percentile (columns 1 and 2). This is consistent with the observation of Brown et al. (2015) and Kingdon and Knight (2007) that relative income has a weaker effect on SWB if the reference group is broadly defined. The impact of reference group income on SWB changes when it is measured in terms of the position of an individual's income within the income distribution instead of average income of the reference group. SWB is significantly lower if individual income is below the 25th percentile income level (column 5). In a similar vein, SWB increases significantly as the income ranking of an individual within the reference group rises (column 6), consistent with the result obtained by Wu (2020) for Australia. Both these findings signify feelings of relative achievement or relative deprivation compared with others in the reference group, which is the opposite of what the results in the first four columns of Table 7 suggest. Furthermore, when reference income is defined by the position of an individual's income within the income distribution, the association between SWB and absolute income and absolute consumption disappears.

In the case of the consumption-SWB relationship (Table 8), the results for the alternative reference group measures are also mixed. The cell mean consumption has a significant positive effect on SWB (column 4). In contrast, the regional median, regional 75th percentile and predicted consumption have a negative effect, but only the effect of the 75th percentile consumption is statistically significant (columns 1, 2 and 3). SWB is also significantly lower if individual consumption is below the 25th percentile level (column 5). However, an individual's consumption ranking does not have a significant effect on SWB (column 6). The coefficient on absolute consumption ceases to be statistically significant when reference consumption is depicted by the position of an individual within the distribution (columns 5 and 6).

As in the case of income and consumption, the results for wealth ranking and the position of an individual within the wealth distribution are statistically significant (columns 4 and 5 of Table 9) and signify feelings of relative achievement compared with others in the reference group. However, the effect kicks in only if an individual's wealth is above the 75th percentile level. In contrast, reference group average wealth depicted by the regional median has a significant positive effect on SWB, but the effects of the regional p75 and cell mean measures are not statistically significant (columns 1, 2 and 3).

## 7 Conclusions and Discussion

Based on data from the 2017 Slovak Household Finance and Consumption Survey, this paper analyzes the determinants of SWB from a multidimensional perspective and examines several under-explored research questions. The paper combines the different approaches to the analysis of SWB found in the literature. The standard approach to empirical SWB research has tended to focus on the role of income, mainly because of reasons of data availability. In recent years, a small but growing number of studies have highlighted the importance of consumption and wealth when analyzing SWB. A limited number of studies has argued that models exclusively based on income, consumption or wealth are incomplete and that it is important to distinguish between consumption, income and wealth as separate channels affecting SWB. We examine the impact of income, consumption and wealth on SWB simultaneously and find that the absolute level of each of these three variables has a significant positive effect on SWB. This finding remains robust even after the inclusion of self-centered inequality and community-centered inequality as explanatory variables in the regression equations.

The paper also examines the differential effects of separate sources of income, structure of consumption, and components of wealth on SWB. The regression results show that the effect on SWB is stronger for labor income, conspicuous consumption expenditure and gross assets. However, the effects of aggregate measures of income, consumption and net wealth dominate the effects through the subcomponents of these variables, perhaps reflecting measurement issues and the complex transmission channels.

In a departure from much of the existing literature, this paper analyzes concurrently the influence of self-centered inequality and community-centered inequality measures on SWB. The evidence indicates that both types of inequalities are important considerations for SWB. We find that individuals consider the economic wellbeing of their narrow reference groups as positive signals for their own future self-advancement, which holds for income, consumption and to some extent also for wealth. However, when evaluating inequality in broader, regional communities, the associations between inequality and SWB differ for the underlying economic indicators. While regional income inequality has a positive signaling effect for future prospects,

consumption and wealth inequalities bear a negative comparison effect. The above contrasting finding may be explained by the higher visibility of one's consumption and wealth in comparison with income.

Another novel contribution of this paper is that it compares the results for different measures of self-centered inequality on SWB applied to the same sample and concludes that the findings are sensitive to the choice of the inequality measure. Reference group average income and consumption measured based on individual characteristics have a significant positive effect on SWB, signifying a signaling effect, but the effect is not visible when the reference group is measured spatially. In contrast, if the reference group measure is defined by the position of an individual within the distribution of income, consumption, or wealth instead of reference group average, the results indicate an opposite comparison effect on SWB that suggest feelings of relative achievement or relative deprivation compared to others in the reference group. The comparison effect of the distribution-based reference group measure is asymmetric. The comparison effect operates upward if income or consumption is below the 25th percentile (confirming the intuition of Duesenberry, 1949) and downward if wealth level is above the 75th percentile level.

Our findings are particularly noteworthy given Slovakia's unique position in international comparisons. Slovakia exhibits some of the lowest economic inequalities in the European Union, a characteristic largely attributable to its post-communist legacy of widespread home ownership. High home ownership rates are associated with low interregional mobility, which perpetuates regional disparities. Consequently, national inequalities in Slovakia have a significant regional dimension. Incorporating regional comparison groups in our analysis thus tends to mitigate the potential effects of inequality on life satisfaction. Despite this distinctive country context, our study still identifies some negative comparison or envy effects of inequality within the country. Replicating our analysis on data from other countries with higher national inequalities would be an interesting avenue for future research.

The policy implications of the findings of this paper, especially the distributional aspects, are not straightforward. Policies that promote growth in income and consumption and facilitate wealth accumulation should increase welfare or SWB of individuals. However, one should be wary of drawing conclusions based on a snapshot picture of inequalities. It is doubtful that a positive signaling effect of self-centered and community-centered inequalities observed at a particular point in time can be interpreted to mean that increase in inequalities would increase SWB in a dynamic setting. Our evidence shows that the SWB of individuals is influenced by the comparison effect rather than the information effect based on their position in the distribution of income, consumption, and wealth. In particular, it would be important to avoid a widening of inequalities in income and consumption at the lower end of the distribution.

## Appendix

See Tables 10, 11, 12, 13, 14, 15 and 16.

**Table 10** Descriptive statistics

| Variable | Question code* | core/non-core* | mean | s.d | p10 | p50 | p90 |
|---|---|---|---|---|---|---|---|
| *Continuous variables:* | | | | | | | |
| Life satisfaction | HDZ0310 | n–c | 6.7 | 2.0 | 4.0 | 7.0 | 9.0 |
| Age | RA0300 | c | 54.1 | 14.8 | 35.0 | 54.0 | 74.0 |
| Household members | DH0001 | c | 2.8 | 1.4 | 1.0 | 3.0 | 5.0 |
| Income | DI2000 | c | 8.71 | 0.74 | 8.06 | 8.71 | 9.45 |
| Labor income | DI1100 + DI1200 | c | 6.44 | 3.79 | 0.00 | 8.35 | 9.37 |
| Transfer income | DI1500 + DI1600 + DI1700 | c | 5.44 | 3.29 | 0.00 | 6.76 | 8.57 |
| Other income | DI2000-labor i.-transf. i | c | 0.96 | 2.17 | 0.00 | 0.00 | 4.66 |
| Consumption | HI0220 | c | 8.08 | 0.46 | 7.50 | 8.10 | 8.65 |
| Non-conspicuous | HI0220-HI0200-HI0230 | c | 7.75 | 0.46 | 7.15 | 7.77 | 8.34 |
| Conspicuous | HI0200 + HI0230 | c | 4.79 | 2.59 | 0.00 | 5.71 | 7.17 |
| Net wealth | DN3001 | c | 11.29 | 0.44 | 10.84 | 11.23 | 11.78 |
| Total assets | DA3001 | c | 9.95 | 1.94 | 8.50 | 10.32 | 11.36 |
| Total liabilities | DL1000 | c | 2.92 | 3.99 | 0.00 | 0.00 | 9.38 |
| *Categorical variables:* | | | | | | | |
| Education | PA0200 | c | | | | | |
| Lower second. (base) | | | 0.11 | | | | |
| Upper secondary | | | 0.68 | | | | |
| Tertiary | | | 0.21 | | | | |
| Gender | RA0200 | c | | | | | |
| Male (base) | | | 0.66 | | | | |
| Female | | | 0.34 | | | | |
| Labor status | PE0100x | c | | | | | |
| Employed (base) | | | 0.59 | | | | |
| Unemployed | | | 0.03 | | | | |
| Retired | | | 0.35 | | | | |
| Other | | | 0.03 | | | | |
| Marital status | PA0100 | c | | | | | |
| Single (base) | | | 0.12 | | | | |
| Married | | | 0.62 | | | | |
| Widowed | | | 0.15 | | | | |
| Divorced | | | 0.11 | | | | |
| Urbanization | SC0310 | c | | | | | |
| City | | | 0.23 | | | | |
| Town or suburbs | | | 0.34 | | | | |
| Village (base) | | | 0.43 | | | | |
| Kids in the household | Dhchildrendependent | c | | | | | |
| None (base) | | | 0.60 | | | | |
| One or more | | | 0.40 | | | | |

Income, consumption, net wealth, and their components are measured in logarithms of per capita values

*Link to the HFCS questionnaire: core questions are included for 22 EU countries participating in the survey (20 euro area countries, Hungary and Poland), non-core questions are available for selected countries only

**Table 11** Regional inequality measures

| Indicator | SK | BB | BA | KE | NR | PO | TN | TT | ZA |
|---|---|---|---|---|---|---|---|---|---|
| p90/p10 | | | | | | | | | |
| Income | 4.01 | 4.74 | 3.69 | 3.64 | 3.51 | 4.42 | 3.95 | 3.72 | 3.42 |
| Consumption | 3.17 | 2.83 | 2.50 | 3.50 | 3.10 | 3.35 | 2.61 | 2.88 | 2.97 |
| Net wealth | 26.05 | 23.59 | 15.18 | 60.51 | 27.38 | 21.50 | 18.36 | 82.69 | 16.90 |
| p90/p50 | | | | | | | | | |
| Income | 2.10 | 2.16 | 2.25 | 1.88 | 1.87 | 1.98 | 2.13 | 2.35 | 2.08 |
| Consumption | 1.73 | 1.65 | 1.54 | 1.63 | 1.80 | 1.64 | 1.65 | 1.82 | 1.80 |
| Net wealth | 3.02 | 3.83 | 2.15 | 3.70 | 3.63 | 3.17 | 2.44 | 2.24 | 2.75 |
| p50/p10 | | | | | | | | | |
| Income | 1.91 | 2.20 | 1.64 | 1.93 | 1.88 | 2.23 | 1.86 | 1.58 | 1.64 |
| Consumption | 1.83 | 1.71 | 1.63 | 2.14 | 1.72 | 2.04 | 1.59 | 1.58 | 1.65 |
| Net wealth | 8.61 | 6.15 | 7.07 | 16.35 | 7.54 | 6.78 | 7.52 | 36.96 | 6.17 |
| Gini | | | | | | | | | |
| Income | 0.35 | 0.47 | 0.32 | 0.33 | 0.29 | 0.32 | 0.34 | 0.32 | 0.29 |
| Consumption | 0.25 | 0.26 | 0.23 | 0.25 | 0.24 | 0.27 | 0.22 | 0.24 | 0.25 |
| Net wealth | 0.56 | 0.62 | 0.42 | 0.63 | 0.58 | 0.60 | 0.48 | 0.57 | 0.45 |

*SK* - Slovakia, *BB* - Banská Bystrica, *BA* - Bratislava, *KE* - Košice, *NR* - Nitra, *PO* - Prešov, *TN* - Trenčín, *TT* - Trnava, *ZA* - Žilina. Income, consumption, and net wealth per household member

**Table 12** Correlation matrix of subjective well-being and the main explanatory variables

| | SWB | Income | Consump | Net wealth | Cell mean income | Cell mean consump | Cell mean net wealth | Income p50/p10 | Consump. p50/p10 | Net wealth p90/p50 |
|---|---|---|---|---|---|---|---|---|---|---|
| SWB | 1.000 | | | | | | | | | |
| Income | 0.241 | 1.000 | | | | | | | | |
| Consumption | 0.188 | 0.484 | 1.000 | | | | | | | |
| Net wealth | 0.277 | 0.334 | 0.433 | 1.000 | | | | | | |
| Cell mean income | 0.214 | 0.356 | 0.327 | 0.306 | 1.000 | | | | | |
| Cell mean consump | 0.162 | 0.271 | 0.430 | 0.306 | 0.761 | 1.000 | | | | |
| Cell mean net wealth | 0.186 | 0.269 | 0.325 | 0.406 | 0.755 | 0.755 | 1.000 | | | |
| Income p50/p10 | −0.068 | −0.110 | −0.175 | −0.074 | −0.308 | −0.407 | −0.182 | 1.000 | | |
| Consump. p50/p10 | −0.082 | −0.079 | −0.142 | −0.073 | −0.222 | −0.331 | −0.180 | 0.568 | 1.000 | |
| Net wealth p90/p50 | −0.131 | −0.129 | −0.201 | −0.126 | −0.363 | −0.468 | −0.311 | 0.700 | 0.588 | 1.000 |

Income, consumption, net wealth, and their cell means are measured in natural logarithms of per capita values. Percentile ratios p50/p10 and p90/p50 are computed from per capita values. All correlations are statistically significant at the 1% level

**Table 13** Variance Inflation Factors (VIF) for specifications in Table 1

| | (1) VIF | (2) VIF | (3) VIF | (4) VIF | (5) VIF | (6) VIF | (7) VIF | (8) VIF |
|---|---|---|---|---|---|---|---|---|
| Income | 1.457 | 1.638 | 1.518 | 1.659 | | 1.685 | 1.694 | |
| Labor income | | | | | 2.537 | | | 2.943 |
| Transfer income | | | | | 2.127 | | | 2.127 |
| Other income | | | | | 1.149 | | | 1.116 |
| Consumption | | 1.805 | | 1.925 | 1.785 | | 1.867 | |
| Conspicuous cons | | | | | | 1.563 | | 1.726 |
| Other consumption | | | | | | 1.853 | | 1.741 |
| Net wealth | | | 1.345 | 1.434 | 1.455 | 1.421 | | |
| Total assets | | | | | | | 1.314 | 1.324 |
| Total liabilities | | | | | | | 1.32 | 1.321 |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Income, consumption, net wealth, and their components are measured in natural logarithms of per capita values. Control variables are the same as in Table 1. See note under the table

**Table 14** Means of income, consumption, and net wealth by region-age-education cells (euros)

| Age | Education | BB | BA | KE | NR | PO | TN | TT | ZA |
|---|---|---|---|---|---|---|---|---|---|
| 20–45 | Low | | | | | | | | |
| | Income | 4820 | 9131 | 5178 | 3865 | 4646 | 8811 | 5986 | 4927 |
| | Consumption | 2362 | 4604 | 2823 | 2317 | 2436 | 3453 | 3314 | 3154 |
| | Net wealth | 14,482 | 39,356 | 22,009 | 11,162 | 25,434 | 28,130 | 16,851 | 25,059 |
| | Observations | 40 | 63 | 48 | 31 | 40 | 37 | 34 | 41 |
| 20–45 | High | | | | | | | | |
| | Income | 5995 | 11,529 | 10,503 | 9411 | 5910 | 8995 | 11,798 | 7452 |
| | Consumption | 2960 | 5018 | 4415 | 3529 | 2827 | 3108 | 3155 | 3886 |
| | Net wealth | 33,538 | 43,430 | 48,333 | 30,904 | 26,497 | 64,422 | 23,315 | 40,020 |
| | Observations | 14 | 50 | 18 | 9 | 14 | 19 | 8 | 12 |
| 46–60 | Low | | | | | | | | |
| | Income | 6010 | 9076 | 5904 | 6870 | 6369 | 9481 | 7829 | 5908 |
| | Consumption | 3007 | 4630 | 3097 | 3494 | 3306 | 4071 | 4165 | 2925 |
| | Net wealth | 48,149 | 67,208 | 31,993 | 30,051 | 47,041 | 43,622 | 35,521 | 31,065 |
| | Observations | 62 | 48 | 67 | 63 | 76 | 56 | 43 | 64 |
| 46–60 | High | | | | | | | | |
| | Income | 23,096 | 13,112 | 13,036 | 10,462 | 8839 | 12,586 | 17,896 | 7190 |
| | Consumption | 5032 | 5086 | 4753 | 3466 | 4003 | 4367 | 7311 | 3430 |
| | Net wealth | 155,297 | 71,413 | 122,989 | 93,045 | 87,423 | 60,878 | 147,640 | 29,818 |
| | Observations | 22 | 33 | 28 | 22 | 22 | 20 | 14 | 13 |
| > 60 | Low | | | | | | | | |
| | Income | 5231 | 6784 | 5320 | 5126 | 5366 | 5844 | 5838 | 5269 |
| | Consumption | 3548 | 4399 | 3488 | 3565 | 3624 | 3620 | 4341 | 3501 |
| | Net wealth | 30,753 | 69,450 | 30,111 | 32,351 | 34,184 | 40,223 | 50,445 | 35,457 |
| | Observations | 129 | 72 | 102 | 142 | 109 | 89 | 111 | 108 |
| > 60 | High | | | | | | | | |
| | Income | 8447 | 7665 | 9845 | 9178 | 7321 | 10,489 | 7568 | 10,030 |
| | Consumption | 4946 | 4393 | 4246 | 4230 | 3892 | 3872 | 4757 | 5179 |
| | Net wealth | 97,447 | 62,410 | 63,776 | 84,725 | 92,595 | 59,740 | 71,946 | 57,421 |
| | Observations | 23 | 23 | 30 | 23 | 23 | 21 | 25 | 18 |

Age refers to the reference person of the household, low education level means ISCED 3 or lower. Income, consumption, and net wealth are expressed in euros per capita and per year. Note that these figures entered the regression equations after the logarithmic transformation

**Table 15** Means of income, consumption, and net wealth by cells (fraction of the national mean)

| Age | Education | BB | BA | KE | NR | PO | TN | TT | ZA |
|---|---|---|---|---|---|---|---|---|---|
| 20–45 | Low | | | | | | | | |
| | Income | 0.63 | 1.20 | 0.68 | 0.51 | 0.61 | 1.16 | 0.79 | 0.65 |
| | Consumption | 0.66 | 1.28 | 0.79 | 0.64 | 0.68 | 0.96 | 0.92 | 0.88 |
| | Net wealth | 0.34 | 0.92 | 0.51 | 0.26 | 0.59 | 0.66 | 0.39 | 0.59 |
| | Observations | 40 | 63 | 48 | 31 | 40 | 37 | 34 | 41 |
| 20–45 | High | | | | | | | | |
| | Income | 0.79 | 1.51 | 1.38 | 1.23 | 0.78 | 1.18 | 1.55 | 0.98 |
| | Consumption | 0.82 | 1.40 | 1.23 | 0.98 | 0.79 | 0.86 | 0.88 | 1.08 |
| | Net wealth | 0.78 | 1.01 | 1.13 | 0.72 | 0.62 | 1.51 | 0.54 | 0.94 |
| | Observations | 14 | 50 | 18 | 9 | 14 | 19 | 8 | 12 |
| 46–60 | Low | | | | | | | | |
| | Income | 0.79 | 1.19 | 0.77 | 0.90 | 0.84 | 1.24 | 1.03 | 0.77 |
| | Consumption | 0.84 | 1.29 | 0.86 | 0.97 | 0.92 | 1.13 | 1.16 | 0.81 |
| | Net wealth | 1.12 | 1.57 | 0.75 | 0.70 | 1.10 | 1.02 | 0.83 | 0.73 |
| | Observations | 62 | 48 | 67 | 63 | 76 | 56 | 43 | 64 |
| 46–60 | High | | | | | | | | |
| | Income | 3.03 | 1.72 | 1.71 | 1.37 | 1.16 | 1.65 | 2.35 | 0.94 |
| | Consumption | 1.40 | 1.41 | 1.32 | 0.96 | 1.11 | 1.21 | 2.03 | 0.95 |
| | Net wealth | 3.63 | 1.67 | 2.87 | 2.17 | 2.04 | 1.42 | 3.45 | 0.70 |
| | Observations | 22 | 33 | 28 | 22 | 22 | 20 | 14 | 13 |
| $>60$ | Low | | | | | | | | |
| | Income | 0.69 | 0.89 | 0.70 | 0.67 | 0.70 | 0.77 | 0.77 | 0.69 |
| | Consumption | 0.99 | 1.22 | 0.97 | 0.99 | 1.01 | 1.01 | 1.21 | 0.97 |
| | Net wealth | 0.72 | 1.62 | 0.70 | 0.76 | 0.80 | 0.94 | 1.18 | 0.83 |
| | Observations | 129 | 72 | 102 | 142 | 109 | 89 | 111 | 108 |
| $>60$ | High | | | | | | | | |
| | Income | 1.11 | 1.01 | 1.29 | 1.20 | 0.96 | 1.38 | 0.99 | 1.32 |
| | Consumption | 1.38 | 1.22 | 1.18 | 1.18 | 1.08 | 1.08 | 1.32 | 1.44 |
| | Net wealth | 2.28 | 1.46 | 1.49 | 1.98 | 2.16 | 1.40 | 1.68 | 1.34 |
| | Observations | 23 | 23 | 30 | 23 | 23 | 21 | 25 | 18 |

Age refers to the reference person of the household, low education level means ISCED 3 or lower

**Table 16** Full set of estimates for the baseline model in Table 1, column 4

| | (1) |
|---|---|
| Income | 0.269*** |
| Consumption | 0.278* |
| Net wealth | 0.911*** |
| Age of HH head | −0.103*** |
| Age of HH head^2 | 0.001*** |
| Education level of HH head (base: Lower sec.) | |
| Upper secondary | 0.203 |
| Tertiary | 0.796*** |
| Female HH head | 0.054 |
| Labor market status (base: Employed) | |
| Unemployed | −0.873*** |
| Retired | −0.179 |
| Other | −0.637* |
| Marital status (base: Single) | |
| Married | 0.461** |
| Widowed | −0.171 |
| Divorced | −0.381* |
| Degree of urbanization (base: Village) | |
| City | 0.195 |
| Town or suburbs | −0.065 |
| Children in the HH | 0.553*** |
| Subregional dummies (base: Bratislava) | |
| Banské mestá | −0.897*** |
| Dolná Nitra | −0.159 |
| Dolné Považie | 0.062 |
| Dolný Zemplín | −0.509 |
| Horehronie | 0.193 |
| Horná Nitra | −0.525* |
| Horné Považie-Liptov | 0.352 |
| Horný Zemplín | 0.075 |
| Juhoslovenská kotlina | 0.168 |
| Kopanice | 0.077 |
| Košická kotlina -Torysa | −0.097 |
| Kysuce a Orava | 0.186 |
| Podunajsko | −0.183 |
| Spišské mestá | −0.015 |
| Stredné Považie | −0.435* |
| Constant | −5.909*** |
| Adjusted R-squared | 0.2249 |
| Observations | 2179 |

Income, consumption, and net wealth are measured in natural logarithms of per capita values. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels based on bootstrapped standard errors

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