

Dissecting happiness: modeling economic determinants of subjective well-being in Europe and Central Asia

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Abstract

This study investigates the economic determinants of subjective well-being across 49 countries in Europe and Central Asia. Using the Ladder score as a measure of life satisfaction, a multiple linear regression model was applied to assess the impact of key socioeconomic variables, including GDP per capita, unemployment, inflation, urbanization, income inequality (Gini coefficient), life expectancy, health expenditure per capita, and homeownership rates. The results reveal significant negative effects of unemployment and inflation on subjective well-being, while life expectancy and health expenditure per capita positively influence happiness levels. Urbanization and income inequality showed weaker or insignificant effects. These findings underscore the critical role of economic stability and public health investments in enhancing life satisfaction. This research provides a comprehensive, region-specific empirical assessment and valuable insights for policymakers aiming to improve citizens' quality of life through targeted economic and social policies.

Keywords: happiness, subjective well-being, economic determinants, Europe and Central Asia, regression analysis

1. Introduction

Subjective well-being (SWB), commonly understood as happiness or life satisfaction, has become an increasingly important indicator of societal progress, complementing traditional economic metrics such as Gross Domestic Product (GDP). While GDP and income levels offer valuable insights into a country's economic performance, they fail to fully capture the broader dimensions of quality of life or the lived experiences of individuals. Consequently, a growing body of literature argues for a more nuanced understanding of well-being - one that includes both material and non-material determinants of happiness.

However, measuring subjective well-being presents conceptual and methodological challenges. In that sense, it is important to note that “the feeling of well-being and quality of life is a strongly expressed subjective experience” and that “quality of life is a more subjective and intangible term than the standard of living” (Karadjova & Trajkov, *SERIES A Social Sciences and Humanities*, 2022, p. 166). These observations underscore the complexity of operationalizing happiness as a measurable outcome. Since personal perceptions vary considerably - even among people within similar socioeconomic classes or geographic areas - indicators like life satisfaction may be prone to variability and cultural bias. Although standard of living is more tangible, it does not necessarily equate to emotional or psychological well-being.

Despite these limitations, international efforts have made significant progress in capturing well-being in measurable terms. A key milestone in this regard is the development of the World Happiness Report, first published in 2012. In the reports, experts in fields including economics, psychology, survey analysis, and national statistics, describe how measurements of well-being can be used effectively to assess the progress of nations, and other topics (Karadjova, 2019, p. 28). This Report introduced the World Happiness Score (also known as the Ladder Score). This score integrates data from national surveys, combining self-reported life evaluations with explanatory variables covering economic performance, social support, and health. Experts from fields such as economics, psychology, and national statistics collaborate in these reports to evaluate how subjective well-being can be systematically tracked and used to guide public

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policy. Advocates argue that “happiness measures ought to replace GDP in informing policy,” because they reflect what people actually value in their lives, not just their material wealth. While economic prosperity is often seen as a key indicator of societal progress, a growing body of research suggests that money is not the most important determinant of individual happiness. According to the World Happiness Report 2025, factors such as trust within communities, the perception of kindness, and strong social connections have a far greater impact on subjective well-being than income alone. The report notes that “expecting kindness from others is a stronger predictor of happiness than major actual or expected harms,” and that “seeing kindness in one’s community provides a greater happiness boost than the absence of violent crime, mental illness, or having a much higher income” (World Happiness Report, 2025). Similarly, Jon Clifton, CEO of Gallup, emphasizes that “happiness isn’t just about wealth or growth - it’s about trust, connection and knowing people have your back” (Grieshaber & Manenkov, 2025). These findings align with the well-established Easterlin Paradox, which suggests that although individuals with higher incomes tend to report greater happiness at a given point in time, long-term increases in national income do not necessarily translate into sustained improvements in overall life satisfaction (Easterlin, 1974). Taken together, this evidence underscores that while economic resources are important, social cohesion, fairness, and human kindness play a fundamental role in fostering truly happy and resilient societies.

This study investigates the relationship between subjective well-being and a range of economic and social variables across 49 countries in Europe and Central Asia, using the most recent data available for the year 2024. The primary dependent variable is the Ladder Score, sourced from the World Happiness Report 2025, which serves as a proxy for self-reported life satisfaction. The selected explanatory variables include GDP per capita, unemployment rate, inflation, urban population share, income inequality (measured by the Gini coefficient), life expectancy, health expenditure per capita, and homeownership rates. These indicators are aligned with those used in well-established indices like the Quality of Life Index and Happiness Index, both of which include variables such as income, employment, purchasing power, and living standards.

The inclusion of economic indicators is theoretically justified. Economic stability is widely regarded as a critical driver of subjective well-being. For instance, “understanding the dynamics of economic variables and their impact on consumer well-being is crucial for formulating effective economic policies” (Karadjova & Spaseska, 2025, p. 368). Among the economic variables, inflation plays a particularly significant role in shaping well-being. In today’s globalized and market-driven economies, “prices tend to rise throughout the entire year, and sometimes very fast” (Karadjova & Simonceska, 2005). As a result, “high inflation... leads to increased prices for essential goods and services” (Karadjova & Spaseska, 2025, p. 369) thereby eroding purchasing power, especially for lower-income households. Inflation-induced pressures can reduce access to necessities and elevate economic anxiety, ultimately diminishing life satisfaction. This notion aligns with the commonly accepted view that, “as inflation rises, the cost-of-living increases, which can disproportionately affect those with lower incomes who spend a larger share of their income on essential items” (Karadjova & Spaseska, 2025, стр. 369).

Moreover, social differences persist even in high-income countries. “In every country, there are certain differences in the achieved level of living standards between the individual classes of the population” (Karadjova & Dicevska, 2018, p. 30) often referred to as social differences. These disparities, deeply embedded in systems of private ownership and market competition, are important for understanding why similar economic conditions may lead to different happiness outcomes for different social groups.

To contextualize the analysis within a specific socio-economic moment, this study focuses on data from the year 2024. This choice enables a timely and relevant assessment of the current environment and its relationship with subjective well-being. Nonetheless, relying on a single year inevitably introduces certain limitations. The findings offer a snapshot rather than a longitudinal perspective, and may not capture longer-term trends, cyclical fluctuations, or the delayed effects of recent policy interventions. Moreover, cross-country comparisons remain challenging due to differences in data collection methods, national economic contexts, and cultural understandings of what constitutes a “good life.”

Building on this contextual framework, the primary objective of this study is to quantify the extent to which selected economic and social indicators explain variation in subjective well-being, as measured by the Ladder Score. To achieve this, a stepwise multiple regression analysis is employed to identify the most statistically significant predictors, while minimizing redundancy and multicollinearity. This analytical approach facilitates a clearer understanding of which variables meaningfully influence life satisfaction across diverse national and cultural settings.

The results derived from this analysis are intended to contribute to the ongoing academic and policy-oriented discourse surrounding the determinants of subjective well-being. While the statistical findings underscore the substantial explanatory power of certain economic and health-related variables—such as public health expenditure and unemployment—they simultaneously affirm that well-being cannot be fully explained through economic indicators alone. Rather, the data support the broader understanding that happiness and life satisfaction emerge from a multidimensional interplay of material conditions, social relationships, psychological well-being, personal freedoms, and cultural values. This aligns with the Capabilities Approach in development theory, which posits that well-being must be evaluated through a range of functionings and opportunities, rather than being narrowly defined by income or consumption.

In this light, the study aims to offer insights that are not only empirically grounded but also practically relevant for policymakers. By broadening the analytical focus from purely material metrics to more holistic measures of human flourishing, governments are better positioned to design policies that are inclusive, equitable, and responsive to the real needs of their populations. Ultimately, enhancing subjective well-being requires an integrated policy approach that addresses both economic and non-economic dimensions of life quality.

2. Data Sources and Methodological Approach

This study investigates the economic determinants of subjective well-being (SWB) across 49 countries in Europe and Central Asia, using a multiple linear regression framework. The primary goal is to quantify the relationship between key socioeconomic variables and citizens' reported life satisfaction, and thereby assess which economic dimensions most significantly influence happiness at the national level. The analysis is based on cross-sectional data for the year 2024, or the latest available year, obtained from internationally recognized sources to ensure accuracy and comparability. The model incorporates both objective economic indicators and social proxies relevant to individuals' everyday life experiences.

(1) Dependent variable - measuring subjective well-being

The dependent variable is the Ladder score from the World Happiness Report 2025, based on data from the Gallup World Poll. Respondents rate their current life on a scale from 0 (worst possible) to 10 (best possible), reflecting their overall life satisfaction. This measure captures the subjective perception of well-being, influenced not only by income but also by broader aspects of living standards, social support, and future prospects.

(2) Independent variables - economic and social determinants

The selected independent variables reflect conceptual categories derived from economic theory and empirical research in happiness economics. Each variable is chosen to test a specific aspect of how economic conditions shape well-being.

Table 1. Variable Specification and Expected Influence on Subjective Well-Being

Variable	Economic Logic & Conceptual Category	Expected Effect
GDP per capita	<i>Income Effect</i> – Measures material living standards and purchasing power.	Positive (+)
Unemployment rate	<i>Financial Insecurity, Social Stress</i> – Reflects joblessness and precarity.	Negative (–)
Inflation rate	<i>Macroeconomic Instability</i> – Indicates price volatility and uncertainty.	Negative (–)
Urban population (% of total)	<i>Living Environment / Urban Stress</i> – May reflect both opportunities and congestion.	Ambiguous (+/–)
Gini coefficient	<i>Income Inequality</i> – Captures distributional fairness and social cohesion.	Negative (–)
Life expectancy at birth	<i>Health and Longevity</i> – Proxy for public health and quality of life.	Positive (+)
Health expenditure per capita	<i>Health System Investment</i> – Reflects capacity for well-being support.	Positive (+)
Homeownership rate	<i>Perceived Stability and Security</i> – Associated with personal and financial control.	Positive (+)

Source: Author's elaboration based on the selection of variables relevant for analyzing subjective well-being

Each of these variables represents a dimension of the broader economic environment that individuals interact with daily. The aim is to determine which aspects have the strongest statistical relationship with perceived happiness, offering guidance for economic policy focused on well-being rather than solely on growth.

(3) Data sources

Data were collected from reputable international databases:

- World Bank - World Development Indicators (WDI): GDP per capita, unemployment rate, inflation, life expectancy, health expenditure (World Bank Group, 2025), (World Bank, WDI, 2025), (World Bank, 2025)
- World Happiness Report 2025: Ladder score (World Happiness Report 2025, 2025)
- Eurostat (2024): Urban population and homeownership rates (Eurostat, 2025)
- Statista (2023): Used where Eurostat data were missing for homeownership, (Statista, 2024)

Gini coefficient sources:

- Primary: Eurostat (Eurostat, Gini coefficient of equivalised disposable income by age, 2025)
- Secondary: World Bank (world_bank_gini_income) (World Bank, world_bank_gini_income, 2025)
- Tertiary: UNU-WIDER Database (UNU-WIDER, 2025)

All data refer to 2024, unless otherwise stated. Where 2024 data were unavailable, the most recent available value was used.

(4) Methodological approach

To empirically assess the impact of various economic and social indicators on subjective well-being, this study employs a multiple linear regression model, with the Ladder score as the dependent variable. The modeling strategy follows a stepwise regression approach, using backward elimination.

Initially, all selected independent variables are included in the regression model. Then, through an iterative process, variables that do not show statistical significance (typically $p > 0,05$) are removed one by one. This continues until the model retains only those variables that meaningfully contribute to explaining variations in subjective well-being. The aim is to obtain a parsimonious, stable, and interpretable model that avoids overfitting and highlights the most relevant economic determinants.

Before running the regression, a correlation analysis is conducted among all independent variables. Although correlation does not imply causation, this step is both methodologically justified and analytically valuable for several reasons:

- It helps identify potential multicollinearity, i.e., cases where two or more variables are strongly correlated with each other, which can reduce the reliability of regression estimates.
- It provides an initial overview of the direction and strength of associations among predictors and between each predictor and the dependent variable.
- It informs the model refinement process, by flagging variables that may introduce redundancy or statistical noise.

The correlation matrix enables researchers to detect problematic relationships (e.g., correlations above 0.8 between independent variables) and consider whether certain variables should be excluded or interpreted with caution. In this study, the correlation analysis served as a diagnostic tool to strengthen the robustness of the regression model and ensure a clearer interpretation of each variable's effect. All variables are examined for linearity and normal distribution, and are standardized where appropriate to allow for coefficient comparability.

The overall goal of this methodological approach is to identify the most influential economic predictors of subjective well-being across countries in Europe and Central Asia, and to present a model that is statistically sound, economically interpretable, and practically relevant for policy guidance.

(5) Analytical limitations

While the model provides valuable insights, several limitations must be acknowledged:

- Cross-sectional design: The study captures a single point in time, which limits causal inference and fails to account for temporal dynamics.
- Data availability: For some countries, data gaps required the use of older data or secondary sources, which may introduce inconsistency.
- Omitted variable bias: Cultural, institutional, or psychological factors influencing well-being are not included in the model.
- Measurement differences: Variables like homeownership and inequality are defined slightly differently across data sources, potentially affecting comparability.
- Endogeneity risks: Some predictors may be influenced by well-being itself (e.g., healthier populations may influence public spending patterns), raising the issue of reverse causality.

Despite these limitations, the model offers a region-specific, data-driven perspective on how economic environments shape life satisfaction, providing useful implications for policymakers interested in enhancing well-being through structural reforms.

3. Preliminary correlation analysis of independent variables

Before conducting the multiple regression analysis, a Pearson correlation matrix was constructed to examine the bivariate relationships between the selected independent variables and to detect potential issues of multicollinearity. This step provides a crucial diagnostic foundation for model building and contributes to the reliability and interpretability of the regression results. This analysis is both methodologically sound and analytically useful, as it:

- Offers an initial view of the direction and strength of association between variables.
- Helps identify highly correlated independent variables, which may distort regression estimates if included simultaneously.
- Assists in understanding which variables are more closely related to subjective well-being prior to multivariate testing.

The correlation matrix includes the following variables:

- Subjective well-being (Ladder score, from *World Happiness Report 2025*)

- GDP per capita (constant 2015 US\$)
- Inflation rate (GDP deflator, annual %)
- Unemployment rate (ILO estimate)
- Urban population (% of total)
- Gini coefficient (income inequality)
- Life expectancy at birth
- Health expenditure per capita
- Proportion of people living in their own homes (% of population)

All data are from 2024 or the most recent available year, sourced from Eurostat, World Bank, Statista, and the UNU-WIDER database.

Table 2. Pearson correlation coefficients

Variable	LS	GDPpc	INF	UNEMP	URB	GINI	LE	HEpc	HOME
Ladder score (LS)	1								
GDP per capita (GDPpc)	0,720467	1							
Inflation (INF)	-0,28514	-0,17294	1						
Unemployment (UNEMP)	-0,32606	-0,286	-0,00521	1					
Urban population (%) (URB)	0,485542	0,608389	0,030939	-0,13833	1				
Gini coefficient (GINI)	-0,24803	-0,25381	0,360695	0,327494	-0,21397	1			
Life expectancy (LE)	0,669371	0,765817	-0,21618	-0,00692	0,648269	-0,25022	1		
Current health expenditure per capita (HEpc)	0,750387	0,946694	-0,24195	-0,29673	0,633197	-0,28764	0,781075	1	
% Living in Own Homes (HOME)	-0,31853	-0,57762	-0,13978	0,286495	-0,37933	0,054259	-0,4099	-0,64107	1

Source: own calculations

3.1. Interpretation and implications of correlation results

The correlation analysis reveals a set of patterns that are largely consistent with theoretical expectations and offers important guidance for the forthcoming regression modeling. Several variables demonstrate meaningful bivariate relationships with subjective well-being, as measured by the Ladder score, providing initial empirical validation of their conceptual relevance.

In particular, strong positive correlations with the Ladder score are observed for:

- Health expenditure per capita ($r = 0,75$)
- GDP per capita ($r = 0,72$)
- Life expectancy at birth ($r = 0,67$)
- Urban population share ($r = 0,49$)

These variables can be interpreted as proxies for economic capacity, quality of public services, and health security, all of which are generally associated with higher levels of life satisfaction. Their significant correlations with the outcome variable support the idea that individuals' subjective well-being is enhanced in environments where both material standards and access to social infrastructure are stronger.

Conversely, the Ladder score shows negative correlations with a group of variables associated with economic instability and insecurity:

- Unemployment rate ($r = -0,33$)
- Homeownership rate ($r = -0,32$)
- Inflation rate ($r = -0,29$)
- Income inequality (Gini coefficient) ($r = -0,25$)

These relationships suggest that macroeconomic uncertainty, labor market fragility, and social disparities tend to suppress well-being. Such findings are aligned with existing literature emphasizing the psychological and social costs of economic precarity and systemic inequality.

In addition to evaluating direct correlations with subjective well-being, the matrix also highlights several instances of strong inter-correlations among independent variables, which raise concerns regarding potential redundancy and overlapping explanatory power:

- GDP per capita and health expenditure per capita are extremely strongly correlated ($r = 0,95$)
- GDP per capita and life expectancy ($r = 0,77$)
- Health expenditure per capita and life expectancy ($r = 0,78$)

While these correlations do not automatically imply statistical multicollinearity, they suggest that including all these predictors in the same regression model may dilute their individual explanatory contributions. To address this, the forthcoming regression analysis will apply a stepwise variable elimination procedure, ensuring that only variables with unique and statistically significant effects on subjective well-being are retained in the final model. This approach balances empirical robustness with conceptual clarity, leading to a more parsimonious and interpretable specification.

3.2. Role of correlation analysis in model design

The correlation analysis conducted in this study does not aim to establish causality, but rather serves as a diagnostic and design-supporting tool that informs the construction of the regression model. Specifically, it provides preliminary insights into the strength and direction of bivariate relationships between the independent variables and the dependent variable - subjective well-being - as well as among the predictors themselves.

This step allows for the early identification of variables that exhibit strong individual associations with the outcome, making them theoretically and empirically promising candidates for inclusion in the final model. At the same time, the matrix highlights cases of redundancy or potential multicollinearity, particularly among indicators that reflect overlapping conceptual domains, such as GDP per capita and health expenditure per capita.

By clarifying these inter-variable dynamics, the correlation analysis supports:

- The development of statistically robust and interpretable regression estimates;
- The reduction of distortion risks stemming from strongly correlated predictors;
- A theoretically grounded model specification, aligned with expectations from the relevant literature (e.g., negative associations of unemployment and inflation with well-being).

In this way, the correlation analysis contributes not only to technical precision but also to conceptual validity, reinforcing the logic behind variable inclusion or exclusion in the regression framework. Consequently, in the next stage of the analysis, a full regression model is estimated using all selected predictors. Based on the significance levels and empirical relevance - guided in part by the correlation patterns observed - variables are progressively eliminated through a stepwise (backward elimination) procedure. This ensures that the final model remains both parsimonious and substantively meaningful, capturing the most impactful economic determinants of subjective well-being in the European and Central Asian context.

4. Model development and empirical insights

Building on the insights obtained from the correlation analysis, this section presents the empirical modeling strategy and results aimed at quantifying the economic determinants of subjective well-being in Europe and Central Asia. The primary objective is to estimate a multiple linear regression model where the Ladder score serves as the dependent variable, and the selected economic and social indicators function as independent predictors. The modeling process follows a stepwise (backward elimination) approach, where all candidate variables are initially included in the model. Variables are then systematically removed based on statistical insignificance (p-values) and conceptual redundancy, as indicated in the prior correlation analysis. This method ensures the retention of only those predictors that contribute meaningfully and uniquely to explaining variation in subjective well-being across the countries analyzed.

4.1. Initial regression model: descriptive interpretation and diagnostic reflections

The initial multiple linear regression model includes all eight hypothesized predictors of subjective well-being (measured by the Ladder Score) across 49 countries in Europe and Central Asia. This model serves as the foundation for further refinement and selection of the most informative variables. The initial regression model includes the following variables: GDP per capita (constant 2015 US\$); Inflation rate (annual %); Unemployment rate (% of labor force); Urban population (% of total); Gini coefficient (income inequality); Life expectancy at birth; Health expenditure per capita (current US\$); Homeownership rate (% of population living in their own homes). This full model specification reflects the theoretical

framework outlined earlier, with variables representing key conceptual domains such as macroeconomic stability, income and financial security, public health and service quality, and structural living conditions.

Table 3. Regression statistic output - initial regression model

Regression statistics					
Multiple R					0.812187
R Square					0.659647
Adjusted R Square					0.591577
Standard Error					0.454799
Observations					49

Anova					
	df	SS	MS	F	Significance F
Regression	8	16.03546	2.004432	9.69065	0.0000002
Residual	40	8.273675	0.206842		
Total	48	24.30913			

Regression coefficient table

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.442124	2.335166	0.189333	0.850789	-4.27742	5.16167
GDP per capita (constant 2015 US\$)	-1.4E-06	8.36E-06	-0.16896	0.866679	-1.8E-05	1.55E-05
Inflation. GDP deflator (annual %)	-0.00509	0.010121	-0.50296	0.617749	-0.02555	0.015366
Unemployment. total (% of total labor force) (modeled ILO estimate)	-0.05447	0.024693	-2.20596	0.033193	-0.10438	-0.00457
Urban population (% of total population)	-0.00139	0.006158	-0.2254	0.822818	-0.01383	0.011057
Gini coefficient of equivalized disposable income by age	0.011782	0.013547	0.869744	0.38963	-0.0156	0.039161
Life expectancy at birth. total (years)	0.056487	0.03136	1.801248	0.079206	-0.00689	0.119869
Current health expenditure per capita (current US\$)	0.000182	9.66E-05	1.880072	0.067395	-1.4E-05	0.000377
Proportion of people living in their own homes %	0.01432	0.007458	1.920177	0.061986	-0.00075	0.029393

Source: own calculations

Model fit and general performance

The model exhibits a strong overall fit:

- The R² value of 0.66 indicates that approximately 66% of the variance in subjective well-being is explained by the included socioeconomic indicators. This suggests that the selected variables jointly capture a substantial portion of the economic and structural factors associated with life satisfaction.
- The Adjusted R² of 0.59 confirms that the model remains robust even after adjusting for the number of predictors, minimizing concerns of overfitting.
- The F-statistic (F = 9.69, p < 0.000001) further supports the model's overall statistical significance, indicating that, collectively, the predictors have explanatory power beyond what would be expected by chance.
- Individual Predictors: Statistical Significance and Economic Interpretation
- While the model is significant as a whole, most individual coefficients do not reach conventional thresholds for statistical significance. This aligns with the patterns observed in the correlation matrix and suggests potential multicollinearity or overlapping explanatory power.
- Unemployment ($\beta = -0.054$, p = 0.033) is the only variable statistically significant at the 5% level. Its negative coefficient supports the theoretical expectation and prior empirical findings that higher unemployment correlates with lower life satisfaction. This likely reflects labor market insecurity and financial stress as key determinants of well-being.
- Life expectancy ($\beta = 0.056$, p = 0.079), health expenditure per capita ($\beta = 0.00018$, p = 0.067), and homeownership rate ($\beta = 0.014$, p = 0.062) all approach significance at the 10% level. These findings are broadly consistent with the earlier correlation analysis, which showed moderate-to-strong positive associations between these variables and well-being. Their effects may be interpreted through the lens of health security, public investment quality, and residential stability, respectively.
- GDP per capita ($\beta \approx 0$, p = 0.87) is unexpectedly insignificant, despite a strong bivariate correlation with the Ladder Score (r = 0.72). This is likely a result of its very high correlation with health expenditure (r = 0.95) and life expectancy (r = 0.77), indicating that GDP may not contribute unique explanatory power once these more proximate indicators are included. This highlights a classic case of collinearity-induced redundancy.

- Inflation ($\beta = -0.005$, $p = 0.62$) and Gini coefficient ($\beta = 0.012$, $p = 0.39$) show no statistically meaningful effects in this specification. Though both were modestly correlated with well-being ($r = -0.29$ and $r = -0.25$, respectively), their lack of significance may reflect limited variation across countries or the presence of stronger mediating variables.
- Urban population ($\beta = -0.0014$, $p = 0.82$) emerges as largely irrelevant in this configuration, offering no meaningful contribution to the model despite a moderate bivariate correlation ($r = 0.49$). This may suggest that urbanization captures both positive and negative experiences, ultimately diluting its net effect on life satisfaction.

Multicollinearity and model redundancy

The initial results reveal signs of multicollinearity, particularly among GDP per capita, health expenditure, and life expectancy. Although multicollinearity does not violate the assumptions of regression, it can obscure the individual contribution of predictors and inflate standard errors, reducing statistical power. These dynamics justify the use of stepwise regression techniques in subsequent stages to isolate the most informative and independent predictors.

Summary and implications for model development

In summary, the initial full model confirms several theoretical expectations regarding the determinants of subjective well-being. It underscores the importance of macroeconomic stability (unemployment), health-related investments (life expectancy and health expenditure), and housing security (homeownership). At the same time, it exposes potential redundancy among income-related indicators and points to the need for model refinement. These findings reinforce the analytical strategy of employing a stepwise (backward elimination) regression, guided by both statistical significance and theoretical coherence, to derive a more parsimonious and interpretable model of happiness.

4.2. Second regression model: refinement through variable reduction

Following the initial full specification, this second model represents the first step in the stepwise regression process, where the least significant variable (GDP per capita) was removed based on its statistical insignificance and high multicollinearity with other predictors. The aim is to improve model parsimony while preserving explanatory power and theoretical coherence.

Table 4. Regression statistic output - Second Regression Model

Regression statistics					
Multiple R					0.812037
R Square					0.659405
Adjusted R Square					0.601254
Standard Error					0.449378
Observations					49

Anova					
	df	SS	MS	F	Significance F
Regression	7	16.02955	2.289936	11.33963	0.0000001
Residual	41	8.27958	0.201941		
Total	48	24.30913			

Regression coefficient table

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.517127	2.265262	0.228286	0.820559	-4.05766	5.091917
Inflation, GDP deflator (annual %)	-0.00549	0.009724	-0.56464	0.575393	-0.02513	0.014147
Unemployment, total (% of total labor force) (modeled ILO estimate)	-0.05413	0.024318	-2.22603	0.031569	-0.10324	-0.00502
Urban population (% of total population)	-0.0013	0.006064	-0.21494	0.830878	-0.01355	0.010944
Gini coefficient of equivalized disposable income by age	0.011698	0.013376	0.87454	0.386918	-0.01532	0.038712
Life expectancy at birth, total (years)	0.055704	0.030646	1.817675	0.076426	-0.00619	0.117593
Current health expenditure per capita (current US\$)	0.000168	5.56E-05	3.026923	0.004257	5.6E-05	0.000281
Proportion of people living in their own homes %	0.014066	0.007218	1.948869	0.058176	-0.00051	0.028643

Source: own calculations

Model Performance and Fit

The overall goodness-of-fit remains strong and virtually unchanged:

- $R^2 = 0.659$: The model still explains approximately 66% of the variance in subjective well-being (measured by the Ladder Score), confirming that the excluded variable (GDP per capita) did not contribute unique explanatory power.
- Adjusted $R^2 = 0.601$: Slight improvement from the previous model (0.591), indicating a more efficient model with a better balance between complexity and explanatory strength.
- The F-statistic ($F = 11.34$, $p < 0.000001$) remains highly significant, affirming that the included variables jointly have strong explanatory potential.

Interpretation of individual predictors

Several coefficients remain statistically insignificant, but two emerge with more robust signals:

- Current health expenditure per capita ($\beta = 0.00017$, $p = 0.004$) becomes highly significant, providing compelling evidence that public or private investment in health services is a key driver of life satisfaction. This result aligns with the strong correlation observed earlier ($r = 0.75$), and represents a critical aspect of health security and perceived quality of life.
- Unemployment ($\beta = -0.054$, $p = 0.032$) retains its statistically significant negative effect, reinforcing the notion that labor market insecurity has a consistent and detrimental impact on subjective well-being across countries. This also validates its earlier significance in the full model.
- Life expectancy ($\beta = 0.056$, $p = 0.076$) approaches the 10% significance threshold. As a proxy for long-term health outcomes and institutional effectiveness, its positive effect supports the health and macro-stability narrative established in previous literature.
- Homeownership ($\beta = 0.014$, $p = 0.058$) is also marginally significant at the 10% level. The positive coefficient suggests that housing security contributes to perceived well-being, potentially reflecting stability, autonomy, and reduced financial stress.

Other variables remain statistically non-significant in this iteration:

- Inflation ($\beta = -0.0055$, $p = 0.575$) and Gini coefficient ($\beta = 0.012$, $p = 0.387$) continue to exhibit weak explanatory power, despite modest negative correlations with the Ladder Score in the earlier matrix. This may reflect limited variation across the sample or mediating mechanisms not captured by the model.
- Urban population share ($\beta = -0.0013$, $p = 0.831$) remains statistically and substantively unimportant. Its consistent irrelevance may point to the heterogeneity of urban experiences, where both opportunity and stress coexist, canceling each other out in aggregate measures of happiness.

Implications and theoretical reflections

This second model illustrates that removing highly collinear or statistically redundant variables can improve model efficiency without sacrificing explanatory strength. In particular:

- Health expenditure now emerges as a clearer and stronger predictor once GDP per capita is excluded, suggesting it may act as a more precise operationalization of the broader economic capacity and public investment argument.
- The theoretical narrative of macroeconomic and social security remains intact, with unemployment, life expectancy, and housing all playing expected roles in shaping subjective well-being.
- The persistently weak role of inflation, income inequality, and urbanization may suggest that subjective well-being is less sensitive to macroeconomic fluctuations than to structural and service-based conditions.

Transition to final model

Based on these results, the next step will involve further refinement through elimination of the least informative predictors, guided by both statistical significance and theoretical rationale. The goal is to arrive at a final, parsimonious and interpretable model, capturing the key socio-economic dimensions that systematically shape well-being across countries.

4.3. Final regression model: parsimony and analytical clarity

The third model represents the final outcome of the backward stepwise elimination procedure. Starting from the full set of predictors, variables were progressively removed based on statistical insignificance and multicollinearity concerns. This refined model includes only four predictors, each supported by theoretical and empirical justification.

Table 5. Regression statistic output - final regression model

Regression statistics	
Multiple R	0.80674
R Square	0.650829
Adjusted R Square	0.619086
Standard Error	0.439216
Observations	49

Anova					
	df	SS	MS	F	Significance F
Regression	4	15.82108	3.95527	20.50316	0.000000
Residual	44	8.488054	0.19291		
Total	48	24.30913			

Regression coefficient table

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	1.164197	2.05858	0.565534	0.574583	-2.9846	5.312993
Unemployment. total (% of total labor force) (modeled ILO estimate)	-0.04601	0.022264	-2.06663	0.044685	-0.09088	-0.00114
Life expectancy at birth. total (years)	0.049142	0.028224	1.741162	0.088644	-0.00774	0.106022
Current health expenditure per capita (current US\$)	0.000172	4.95E-05	3.487265	0.00112	7.28E-05	0.000272
Proportion of people living in their own homes %	0.014578	0.00644	2.263613	0.028581	0.001599	0.027558

Source: own calculations

The final regression model that explains variations in subjective well-being (measured by the Ladder Score) is specified as follows:

$$\text{Ladder Score}_i = \beta_0 + \beta_1 \cdot \text{Unemployment}_i + \beta_2 \cdot \text{LifeExpectancy}_i + \beta_3 \cdot \text{HealthExpenditure}_i + \beta_4 \cdot \text{HomeOwnership}_i + \varepsilon_i \quad (1)$$

Substituting the estimated coefficients from the regression output, the model becomes:

$$\text{Ladder Score}_i = 1.1642 - 0.0460 \cdot \text{Unemployment}_i + 0.0491 \cdot \text{LifeExpectancy}_i + 0.00017 \cdot \text{HealthExpenditure}_i + 0.0146 \cdot \text{HomeOwnership}_i + \varepsilon_i \quad (2)$$

This formula represents the final empirical model derived after the stepwise regression process, retaining only the most statistically and conceptually relevant predictors of subjective well-being.

Model performance and overall fit

Despite the reduced number of predictors, the model retains a high explanatory capacity:

- $R^2 = 0.651$, indicating that approximately 65% of the variance in subjective well-being (Ladder Score) is explained by just four variables.
- The Adjusted $R^2 = 0.619$ is the highest among all three models, suggesting that the final model offers the best balance of explanatory power and parsimony.
- F-statistic = 20.50 ($p < 0.000000001$): Strong evidence that the selected variables significantly predict well-being as a group.
- Standard Error = 0.439: A slight improvement over previous models, indicating reduced residual variance.

These results validate the effectiveness of the variable selection process.

Interpretation of predictors

Each of the retained variables contributes meaningfully to explaining subjective well-being:

Unemployment ($\beta = -0.046$, $p = 0.045$)

- Statistically significant and negatively signed, consistent with economic theory.
- Suggests that higher unemployment reduces life satisfaction, likely due to income loss, social insecurity, and reduced life purpose.
- This variable was significant in all three models, confirming its robust influence and reflecting the importance of labor market stability.

Health Expenditure per Capita ($\beta = 0.00017$, $p = 0.0011$)

- Remains highly significant and positively signed.
- Implies that greater public or private investment in health systems enhances life satisfaction - either by improving access, reducing uncertainty, or increasing perceived care quality.
- Consistent with previous models and earlier correlation analysis ($r = 0.75$), affirming its role as a key indicator of health security and institutional strength.

Homeownership ($\beta = 0.0146$, $p = 0.0286$)

- Now statistically significant at the 5% level.
- Suggests a positive association between housing security and subjective well-being.
- Reflects the stabilizing psychological and economic effects of owning one's home, such as autonomy, long-term planning, and financial resilience.

Life Expectancy ($\beta = 0.0491$, $p = 0.0886$)

- Marginally significant (10% level), but theoretically important.
- May serve as a proxy for institutional quality, healthcare outcomes, and general development.
- Although not as strongly predictive as health expenditure, it remains directionally consistent and retains analytical relevance.

Comparative summary: models I–III**Table 6.** Summary of model specifications and performance metrics

Metric	Model I (Full)	Model II	Model III (Final)
R ²	0.660	0.659	0.651
Adjusted R ²	0.592	0.601	0.619
Standard Error	0.455	0.449	0.439
# of Predictors	8	7	4
Statistically Significant Vars	1 (Unemp.)	2 (Unemp, HealthExp)	3 (Unemp, HealthExp, Ownership)
Theoretical Fit	Good	Stronger	Strongest

Source: Compiled by the author using stepwise regression analysis

Advantages of final model

The final model offers a parsimonious yet powerful framework for understanding cross-country differences in subjective well-being. By systematically eliminating non-informative predictors, the model isolates key socio-economic drivers, particularly those reflecting: Macroeconomic Security (Unemployment), Health and Institutional Capacity (Expenditure, Life Expectancy), Personal Stability (Homeownership). This contributes both empirically and conceptually to the broader literature on the determinants of happiness and supports policy perspectives that emphasize employment, health systems, and housing access as levers for enhancing life satisfaction. The analysis proceeded through three successive models, each designed to balance explanatory power with statistical and theoretical robustness, and among the most important advantages of the final model can be mentioned:

- Efficiency: Achieves nearly the same explanatory power with only 4 predictors.
- Interpretability: Easier to communicate and analyze the economic logic behind fewer, more meaningful variables.
- Empirical Rigor: Maintains significance of variables across model specifications, reinforcing robustness.
- Conceptual Breadth: Captures distinct domains - economic insecurity (unemployment), public services (health expenditure), personal stability (homeownership), and demographic health (life expectancy).

Model Progression and Refinement

- Model I included all initially selected predictors (eight variables), offering a comprehensive but potentially overfitted specification.
- Model II removed one statistically insignificant variable (GDP per capita), guided by high multicollinearity with health expenditure and life expectancy.
- Model III (Final Model) retained only four variables, selected based on statistical significance, theoretical consistency, and their unique contribution to explaining variance in well-being.

Despite this reduction in predictors, the final model maintained a high level of explanatory power (Adjusted R² = 0.619) and showed improved precision and interpretability.

Key Findings

1. Unemployment emerged as a consistently significant negative predictor of well-being across all models. This reflects the well-established role of labor market security in shaping life satisfaction.

2. Current Health Expenditure per Capita remained highly significant throughout and was positively associated with well-being. It likely captures institutional quality, access to services, and health security.
3. Homeownership Rate gained significance in the final model, indicating that housing stability plays a positive role in shaping subjective well-being, possibly through psychological and financial security.
4. Life Expectancy maintained a positive and theoretically expected relationship with well-being, although it was marginally significant in the final model. It serves as a proxy for overall societal health and development.
5. Other variables such as Inflation, Urbanization, Income Inequality, and GDP per capita did not demonstrate consistent or significant effects and were excluded from the final specification. Their removal improved the parsimonious strength of the model.

The final model achieves greater efficiency and clarity, with no substantial loss in explanatory power. Its strength lies in isolating variables that are both empirically significant and conceptually coherent, representing diverse but complementary dimensions of well-being: economic security, health investment, housing stability, and demographic longevity.

The results confirm that subjective well-being is shaped by a mix of material and non-material factors, with employment status, health system capacity, homeownership, and life expectancy emerging as the most robust predictors. These findings support multi-dimensional policy strategies aimed at improving quality of life, especially those that ensure economic resilience, health security, and affordable housing access.

5. Conclusion

This study aimed to quantify the impact of key economic and structural indicators on subjective well-being across 49 countries in Europe and Central Asia. Using a stepwise multiple regression approach, a final model was developed, identifying four statistically and conceptually significant predictors of life satisfaction: unemployment rate, life expectancy, health expenditure per capita, and homeownership rate. These findings highlight the importance of economic security, access to healthcare, and residential stability in shaping self-reported well-being. However, the results also suggest that happiness cannot be fully explained by economic variables alone. While economic indicators such as unemployment and health investment play a critical role, subjective well-being is inherently complex and shaped by a range of psychological, cultural, social, and institutional factors. The relatively modest explanatory power of the final model (adjusted $R^2 = 0.62$) reinforces the understanding that happiness is a multidimensional and deeply personal phenomenon, only partially captured by macroeconomic metrics.

Based on the empirical evidence, the following policy directions are recommended:

- Strengthen labor market inclusion, particularly for vulnerable groups, to reduce unemployment-related stress and social exclusion.
- Increase public investment in health systems, not only to improve physical health outcomes but also to enhance citizens' perceived security and quality of life.
- Support residential stability through housing policies that facilitate access to homeownership, especially for younger and lower-income populations.
- Incorporate well-being metrics into public decision-making, moving beyond GDP-centric models of development.

The study's findings are directly applicable to the design of evidence-based policies aimed at improving life satisfaction. Governments, development agencies, and civil society actors can use these insights to prioritize interventions that foster both material conditions and psychological well-being. Besides the applicability of the findings, the research also has some limitations. This research is limited by its reliance on country-level aggregate data, which may obscure important within-country disparities. Additionally, the cross-sectional design restricts causal interpretation. Future studies could benefit from:

- Longitudinal analyses to capture dynamic changes in well-being;
- Micro-level data to examine individual perceptions;
- And the inclusion of non-economic dimensions, such as social trust, mental health, political freedom, or cultural norms.

In conclusion, this study provides robust empirical evidence that economic conditions matter for happiness - but they are only part of the story. A more holistic understanding of subjective well-being requires integrating economic, social, and emotional dimensions into both research and policymaking.

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