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Research Article

Income Fluctuations and Life Satisfaction: A Gain-Loss Asymmetry Perspective - Evidence from the German Socio-Economic Panel

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Abstract

The primary aim of this paper is to explore the impact of real-life income fluctuations on individuals, focusing specifically on "gain-loss asymmetry"—a phenomenon where losses exert a more pronounced psychological effect than equivalent gains. By analyzing data from the German Socio-Economic Panel (SOEP), this study evaluates the effects of actual income changes on experienced utility, distinguishing between real income variations and anticipated changes. Self-reported life satisfaction is used as a proxy for experienced utility, with income changes determined by comparing current net real household income to that of the previous five years. Employing an ordinary least squares model with a two-way fixed effect estimator, our findings reveal that income losses significantly and negatively affect life satisfaction compared to equivalent gains, with the exception of the first lag. Beyond the first lag, losses exert a significantly greater impact than gains. Notably, the gain-loss asymmetry is more pronounced among middle-income individuals, while categorical losses are more impactful for higher-income groups.

Keywords: *Gain-Loss Asymmetry, Life Satisfaction, Income Fluctuations, Loss Aversion, SOEP, Experienced Utility*

JEL Codes: *D03, I31, D91, C23*

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Araştırma Makalesi

Gelir Dalgalanmalarının Yaşam Memnuniyeti Üzerindeki Etkisi: Kazanç–Kayıp Asimetrisi ve SOEP Verileri

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Öz

Bu çalışmanın temel amacı, gerçek hayatta yaşanan gelir dalgalanmalarının bireyler üzerindeki etkisini incelemek ve özellikle "kazanç–kayıp asimetrisi" olarak adlandırılan olguya odaklanmaktır. Bu olgu, kayıpların psikolojik etkisinin, eşdeğer büyüklükteki kazançlara kıyasla daha güçlü olmasını ifade etmektedir. Alman Sosyo-Ekonomik Paneli (SOEP) verileri kullanılarak gerçekleştirilen bu çalışmada, gerçekleşmiş gelir değişimlerinin deneyimlenen fayda üzerindeki etkileri analiz edilmekte ve fiili gelir değişimleri ile beklenen değişimler arasında ayrım yapılmaktadır.

Anahtar Kelimeler: *Kazanç–Kayıp Asimetrisi, Yaşam Memnuniyeti, Gelir Dalgalanmaları, Kayıptan Kaçınma, SOEP, Deneyimlenen Fayda*

Jel Kodları: *D03, I31, D91, C23*

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1. Introduction

Does an increase in income lead to greater life satisfaction? Conversely, how does a reduction in income affect our sense of well-being? Common intuition suggests a direct, positive relationship between income and happiness. However, the field of happiness economics presents a more nuanced picture.

The concept of Easterlin's paradox, first identified by Easterlin in 1974 and revisited in 1995, challenges the straightforward link between income and happiness. It demonstrates that, despite significant income growth, happiness levels in many countries have remained relatively unchanged. This paradox has generated considerable debate and fostered a substantial body of literature aimed at exploring the complexities of the income-happiness relationship. Foundational research by scholars such as Diener and Oishi (2000), Frey and Stutzer (2000), and Hagerty (2000) established the positive correlation between national income levels and average happiness on an international scale. These studies laid the groundwork for further exploration. Diener and Biswas-Diener (2002) extended this research by incorporating time-series analyses, which illustrated that economic growth in developed countries has a marginal impact on subjective well-being.

Easterlin's explanation for this paradox suggests that beyond a certain income threshold, increased income does not associate with increasing happiness. This phenomenon occurs as individuals' aspirations and expectations rise alongside their income (Easterlin, 2001). This perspective is in line with the hedonic adaptation theory, which posits that individuals adjust to their current income levels, eventually returning to their previous level of happiness after experiencing income growth. The concept of hedonic adaptation, initially proposed by Brickman in 1971, indicates that the happiness boost from income increases is only temporary. Stutzer (2004), Burchardt (2005), Ferrer-i-Carbonell & Van Praag (2008), Clark et al. (2008), and Dumludag (2014) explored this further, uncovering an asymmetry in how individuals react to economic losses versus gains.[1]

1 Another aspect of the Easterlin Paradox is the relative income concept proposed by Duesenberry (1949), where individuals` happiness are based on the disparity between their income and that of a reference group in their circle.

This study delves into the dynamics of income changes over a five-year period and their impact on life satisfaction, focusing on the phenomenon of loss aversion as described by prospect theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991; Thaler et al., 1997). Unlike much of the existing literature that relies on experimental data, our study extends this body of work by examining the effects of actual income changes on experienced utility, adopting a "gain-loss asymmetry" approach from a reference-based perspective.

Much of the existing literature on loss aversion is based on experimental data concerning expected utility, often derived from betting or controlled experiments (e.g., Benartzi & Thaler, 1995; Thaler et al., 1997; Schmidt & Traub, 2002; Erev et al., 2008). Our study aims to build upon this foundation by examining the effects of actual income changes on experienced utility. Given our emphasis on real rather than anticipated changes, we use the term "gain-loss asymmetry" to describe our approach, analyzing the relationship between income changes and life satisfaction from a reference-based perspective.

In light of the asymmetrical findings derived from research on hedonic adaptation and relative happiness, there have been attempts to explain life satisfaction and consequently utility in view of prospect theory. Contributions from Boyce et al. (2013, 2016) have enhanced our understanding by demonstrating how loss aversion in income changes and personality traits like conscientiousness affect these dynamics. Early work by Vendrik and Woltjer (2007), followed by Leites and Ramos (2022), applied prospect theory to the study of life satisfaction, with a particular focus on the effects of losses in comparison to a social reference group. Their research consistently found that losses exert a more significant impact on life satisfaction than gains, a conclusion supported by Fang and Niimi (2017) in their examination of future income expectations. More recent analyses by Yaman et al. (2023) have furthered this inquiry by contrasting expected utility and prospect theory in the realm of life satisfaction. Their work uncovered detailed insights, notably how reductions in losses lead to increased life satisfaction, highlighting the intricate relationship between income changes and subjective well-being.

At the macroeconomic level, Patiño et al. (2022) and Hovi and Laamanen (2017) expanded the scope of research by investigating the asymmetric impacts of economic fluctuations on subjective well-being. Using large-scale datasets like the Eurobarometer, they discovered that economic downturns have a more profound and enduring effect on life satisfaction than economic upswings.

The work of Boyce et al. (2013, 2016), as previously discussed, aligns with our research interests, despite differences in model specifications. They analyzed life satisfaction using lagged values of the dependent variable, changes in income compared to the previous year, and a dummy variable to indicate the occurrence of a loss. Additionally, their study excludes income levels as an explanatory variable, while they support the notion of loss aversion, it remains unclear if income changes affect life satisfaction more than income levels or if loss aversion would persist when income levels are considered. Conversely, Yaman et al. (2023) assessed the impact of changes in income, employment, and health status on life

satisfaction by looking at one-year intervals. In contrast, Di Tella et al. (2010) and Fang and Niimi (2017) delved into the asymmetric effects by focusing on anticipated changes in individuals' income. Di Tella et al. (2010) examine long-term adaptation to changes in income and social status, and they also explore the concept of loss aversion. Their model treats income changes as independent variables and incorporates loss aversion by allowing for asymmetric effects of gains and losses from the present to the next period, based on the assumption that future income closely aligns with anticipated income. Fang and Niimi (2017) employ a similar methodology using data from the Japanese Household Survey. This model presumes that individuals have realistic expectations about their future incomes and only accounts for symmetric effects of past income changes. We consider Di Tella et al.'s modeling strategy to be the most effective for observing the impact of loss aversion. However, our approach differs by focusing on the asymmetric effects of already-realized income changes on current life satisfaction.

While there are only a few studies that delve into life satisfaction through the lens of gain-loss asymmetry, our research distinguishes itself by investigating individuals' past income levels over a five-year period as a foundational reference point, in contrast to the majority of studies which base their findings on comparisons with a designated reference group. At its core, our study examines whether individuals use their past income levels as reference points and further investigates how changes in income affect life satisfaction. This investigation is carried out through a detailed analysis using both quantitative variables and categorical representations, employing dummy variables with various model specifications. Moreover, our study extends the exploration of gain-loss asymmetry across different income categories, offering a comprehensive look at the nuances of how income fluctuations impact subjective well-being.

By exploring the effects of actual income changes on experienced utility, this study aims to bridge a gap in existing literature that has predominantly concentrated on expected or decision utility. Such insights are crucial for informing welfare literature and shaping policy implications, underscoring the importance for policymakers to address the adverse effects of income losses—potentially prioritizing these efforts over the emphasis on income gains. In doing so, our work contributes to the growing body of evidence elucidating the complex relationship between income, loss aversion, and life satisfaction, thereby offering a pivotal resource for both academic and practical applications in economics and welfare policy.

The structure of this paper is as follows: Initially, we will provide descriptive statistics related to income and variables derived from income, such as gains and losses. Subsequently, we will discuss our model and the strategy employed for its prediction, followed by the presentation of regression results. In the discussion and conclusion section, we will address the regression findings and offer policy recommendations.

2. Descriptive Data

This study utilizes data from the German Socio-Economic Panel (SOEP), developed by the German Institute for Economic Research (DIW Berlin) (Goebel et al., 2019). The SOEP is a longitudinal survey that collects data on a variety of aspects, including education, employment, income, health, and life satisfaction, from the same cross-sectional units over time. Our analysis includes both household and individual survey data spanning from 1991 to 2019, involving responses from 84,044 individuals.

Panel data was chosen for its ability to analyze changes at both the personal and household levels over time, which is essential for examining individual income variations over a five-year period. The extensive use of the SOEP in research on happiness, social inequality, poverty, and social mobility renders it particularly suitable for this study. Given the unbalanced nature of the panel, we selected appropriate statistical estimators to accommodate this characteristic.

To offer insights into the amounts of losses and gains and to elucidate the relevant variables, we present summary statistics before their logarithmic transformation. Table 1 presents a range of statistics on the monthly household net income of panel participants, expressed in euros. The first section of the table displays the individuals' monthly after-tax household net income as recorded in the dataset. It reveals that the average monthly household net income is €2,648. This average varies by up to €1,442 across the 84,044 individuals in the panel and fluctuates by as much as €711 over the years for each individual.

The second section of Table 1 illustrates the monthly household net income adjusted for the Consumer Price Index (CPI) based on 2015 prices. After adjusting for CPI, the average household net income stands at €2,944. This adjusted figure shows a variation of up to €1,513 between individuals and up to €767 over the duration of an individual's participation in the panel.

The third section details the monthly net household income, further adjusted for both inflation and household size. With these adjustments, the average monthly household income is €1,797. The standard deviation between groups for this adjusted income is €890, while the standard deviation within groups is €434.

Table 1: Household Monthly Net Income Summary Statistics

	Mean	St. Dev.	Min.	Max	Obs.
Household Monthly Net Income (€)					
General	2647.893	1461.1	460	9000	N = 560381
Between Groups		1441.9	460	9000	n = 84044
Within Group		710.6	-3399.1	9089.7	T-bar = 6.6
Household Monthly Net Income Adjusted by CPI (€) (2015 = 100)					
General	2943.782	1556.8	436.8	12633.7	N = 560381
Between Groups		1512.7	436.8	11708.4	n = 84044
Within Group		766.6	-4128.1	11057.9	T-bar = 6.6
Household Monthly Net Income Adjusted by CPI and Household Size (€)					
General	1796.984	909.3	168.7021	11573.9	N = 560381
Between Groups		889.9	196.3933	9132.3	n = 84044
Within Group		433.8	-3931.4	9422.7	T-bar = 6.6

Table 2 shows the distribution of monthly household net income by income group categories. The relevant income categories are based on the classification of the German Federal Statistical Office (The Federal Statistical Office, 2021).

Table 2: Income Categories

Household Monthly Income (€)	General		Between Groups		Within Group
	Frequency	%	Frequency	%	%
Under 1250 EUR	77457	13.82	24597	29.27	54.34
1251-2500 EUR	239721	42.78	52250	62.17	66.07
2501-3500 EUR	122194	21.81	36230	43.11	47.67
3501-5000 EUR	83146	14.84	25890	30.81	48.59
5000 EUR and more	37863	6.76	12088	14.38	52.17

(n = 84044)

Table 2 highlights the dominance of the "€1,251-€2,500" income bracket, which comprises 43% of the dataset, indicating a significant concentration of households within the lower-middle income range. The stability of this income category is evidenced by a 66% rate, suggesting consistent economic conditions for a large segment of the population over

time. In contrast, the "€5,000 and more" category is the least prevalent, making up only 7% of the dataset. Notably, the "€1,251-€2,500" income range also boasts the highest inclusion rate at 62%, in comparison to the "€5,000 and more" category, which has the lowest inclusion rate at 14%. Despite representing the highest income group, the "€5,000 and more" category ranks third in terms of stability.

Table 3: Gain Variables Summary Statistics

€	Mean	St. Dev.	Min.	Max.	Obs.
Gain compared to last year ($Y_t - Y_{t-1} > 0$)					
General	295.9344	362.4165	.0001221	8878.9	N=230503
Between Groups		296.0561	.0003662	6651.5	n=55903
Within Group		280.2576	-3600.427	7943.7	T-bar= 4.12327
Gain compared to two years ago ($Y_t - Y_{t-2} > 0$)					
General	342.3965	396.1782	.0089111	9023.975	N=215847
Between Groups		318.1908	.0461426	7743.703	n=48351
Within Group		304.4406	-3710.348	8153.911	T-bar= 4.46417
Gain compared to three years ago ($Y_t - Y_{t-3} > 0$)					
General	382.1025	425.4549	.0079346	8749.314	N = 193833
Between Groups		340.639	.2788086	6864.574	n = 41290
Within Group		322.2526	-3197.974	8102.413	T-bar = 4.69443
Gain compared to four years ago ($Y_t - Y_{t-4} > 0$)					
General	420.69	454.5947	.0061035	9164.147	N = 172031
Between Groups		371.4494	.1027832	9164.147	n = 36167
Within Group		335.1955	-3172.12	8088.839	T-bar = 4.75657
Gain compared to five years ago ($Y_t - Y_{t-5} > 0$)					
General	451.2329	476.0868	.006958	8873.676	N = 152910
Between Groups		386.6126	.055542	7129.767	n = 32324
Within Group		343.8323	-4007.262	7946.404	T-bar = 4.73054

Table 3 outlines the gain variables, derived from the monthly household net income after adjusting for inflation and household size. These variables range from €296 to €451, following adjustments for the Consumer Price Index (CPI) and household size. The standard deviation for these gains varies between individuals, falling within the range of €362 to €476. The average gain observed among panel participants may differ from the general average for individuals by €296 to €387. Notably, the relatively high standard deviation within groups—approximately €280 to €344—compared to between groups—around €110—underscores the variability of income gains within individual households over time.

This variability likely reflects diverse economic circumstances or life events that impact household incomes.

Table 4: Loss Variables Summary Statistics

€	Mean	St. Dev.	Min.	Max.	Obs.
Loss compared to last year ($Y_t - Y_{t-1} < 0$)					
General	-265.6023	382.9858	-7959.313	-.0068359	N = 225168
Between Groups		303.2801	-7959.313	-.0588379	n = 54378
Within Group		305.4908	-7151.534	2235.96	T-bar = 4.14079
Loss compared to two years ago ($Y_t - Y_{t-2} < 0$)					
General	-330.3343	437.3853	-9209.993	-.0092773	N = 183368
Between Groups		350.3319	-7079.232	-.0484009	n = 44625
Within Group		336.6933	-6833.3	2865.628	T-bar = 4.10909
Loss compared to three years ago ($Y_t - Y_{t-3} < 0$)					
General	-374.2182	472.3638	-8763.313	-.0113525	N = 155989
Between Groups		382.8692	-6272.396	-.0727539	n = 37303
Within Group		349.898	-6546.724	3374.255	T-bar = 4.18167
Loss compared to four years ago ($Y_t - Y_{t-4} < 0$)					
General	-406.6169	494.401	-8794.634	-.0041504	N = 136145
Between Groups		403.366	-7108.626	-.0217285	n = 32211
Within Group		355.3579	-6631.3	4436.514	T-bar = 4.22666
Loss compared to five years ago ($Y_t - Y_{t-5} < 0$)					
General	-434.2564	515.0289	-9196.808	-.0294189	N = 119026
Between Groups		425.0405	-9196.808	-.1210938	n = 27960
Within Group		360.8096	-6438.02	2984.593	T-bar = 4.25701

Table 4 displays the loss variables, which are also based on the monthly household net income after adjustments for inflation and household size. The average value of these losses ranges approximately from €265 to €434. Individual losses can deviate from the overall average by between €305 and €360. The significant deviation of individual losses from the overall average highlights the diverse impacts of economic downturns on different households. This variation may be influenced by factors such as job loss, health issues, or other personal circumstances affecting household income.

While the descriptive statistics in Table 3 and Table 4 show minimum fluctuations as small as €0.0001, these values are presented primarily to illustrate the full range of the data in real terms. In the econometric analysis, all income-related variables were transformed into logarithmic scales. This transformation ensures that the regression models estimate relative changes rather than absolute Euro amounts, effectively mitigating the influence of negligible nominal fluctuations on the estimated coefficients. Consequently, the potential

measurement error from very small nominal changes is structurally addressed by the model's focus on log differences.

Furthermore, to explore the potential categorical sensitivity of individuals to losses, dummy variables for losses and gains were created. Table 5 summarizes these loss dummy variables:

$$loss_{it} = 1 \; if \; logy_{it} - \log y_{it-s} < 0, \;\; 1 \leq s \leq 5$$

Table 5: Loss Dummies Summary Statistics

	Frequency	%	Cum. %
Loss compared to last year (loss1 = 1 if $Y_t - Y_{t-1} < 0$)			
0	230504	50.59	50.59
1	225168	49.41	100.00
Total = 455672			
Loss compared to two years ago (loss2 = 1 if $Y_t - Y_{t-2} < 0$)			
0	215863	54.07	54.07
1	183368	45.93	100.00
Total = 399231			
Loss compared to three years ago (loss3 = 1 if $Y_t - Y_{t-3} < 0$)			
0	193833	55.41	55.41
1	155989	44.59	100.00
Total = 349822			
Loss compared to four years ago (loss4 = 1 if $Y_t - Y_{t-4} < 0$)			
0	172052	55.83	55.83
1	136145	44.17	100.00
Total = 308197			
Loss compared to five years ago (loss5 = 1 if $Y_t - Y_{t-5} < 0$)			
0	152910	56.23	56.23
1	119026	43.77	100.00
Total = 271936			

Upon reviewing Table 5, it becomes evident that the rate of loss gradually decreases as the length of the difference period increases. Specifically, for a one-year period, 49% of individuals experience a loss, whereas this rate decreases to 44% when comparing losses experienced five years ago.

As a cumulative total, 60% of the panel participants have remained within the study for a duration of up to 5 years out of the total 29-year period. Consequently, the gain and loss variables have been constructed by examining the preceding 5-year timeframe. The selection of a five-year lag structure is primarily driven by the trade-off between longitudinal

depth and statistical power. Extending the lag structure beyond five years would result in a dramatic reduction in the number of observations, compromising the reliability of the estimates and the ability to conduct meaningful subgroup analyses. Thus, the five-year window serves as the optimal balance for observing medium-term income dynamics while maintaining a robust sample size.

3. The Model and the Methodology

The dependent variables in our study categorically ranged from 0 to 10. Models with categorical dependent variables, such as ordered probit or logit models, are therefore suitable for our estimation. In line with recent research, controlling for individual effects is imperative when analyzing the relationship between life satisfaction and various factors (Ferrer-i-Carbonell & Frijters, 2004). Although studies that utilize ordinary least squares (OLS) regression instead of probit or logit models report minimal differences in coefficients, individual effects can significantly alter these relationships.

Given that panel data involves repeated collection of information from the same units over time, accounting for unobserved heterogeneity is essential (Das, 2019). Unobserved heterogeneity, or individual fixed effects, can arise from factors such as genetics, upbringing, and environment (Baltagi, 2008). The choice of an Ordinary Least Squares (OLS) model with a two-way fixed effect estimator is methodologically grounded in the need to control for unobserved heterogeneity. In micro-panel data analysis, individual life satisfaction is often influenced by stable traits such as genetics, upbringing, and personality. Using Fixed Effects (FE) allows the model to control for these time-invariant individual characteristics, which might otherwise bias the relationship between income and well-being. Therefore, our analysis takes into consideration both observable and unobservable effects, as summarized in the following equation:

$$Life\ satisfaction_{it} = \alpha_0 + \alpha_1 logy_{it} + \alpha_2 \Delta y_{it}^{+} + \alpha_3 \Delta y_{it}^{-} + \beta \boldsymbol{X}_{it} + \mu_i + \lambda_t + u_{it}$$

Where:

Δy_{it}^{-} : $Losses$

Δy_{it}^{+}: $Gains$

X_{it}: $Independent\ variables\ vector$

μ_i: $Individual\ fixed\ effects$

λ_t: $Fixed\ year\ effects$

u_{it}: $Idiosyncratic\ error\ term$

The research hypotheses based on the model are as follows:

$$H_1: \alpha_2 \neq \alpha_3$$

This hypothesis posits that the coefficients for the variables indicating gains (Δy_{it}^{+}) and losses (Δy_{it}^{-}) in individuals' household income over the past years will not be equal, implying differing effects on life satisfaction.

$$H_2: \alpha_3 > \alpha_2$$

Second hypothesis suggests that the negative impact on life satisfaction due to income losses will be greater than the positive impact of income gains, indicating an asymmetry between gains and losses.

Models with dummy variables:

$$Life\ satisfaction_{it} = \alpha_0 + \alpha_1 logy_{it} + \alpha_2 loss_{it} + \beta \boldsymbol{X}_{it} + \mu_i + \lambda_t + u_{it}$$

$$loss_{it}: Loss\ dummies$$

For the analysis of categorical losses, the model is as follows:

$$H_3: \alpha_2 < 0$$

This hypothesis predicts that the coefficient for the loss dummy variable will be negative, indicating the expected adverse effect of being in a loss status on life satisfaction.

3.1. Dependent Variable

The dependent variable "life satisfaction", serving as a proxy for utility, is measured on a scale from 0 to 10. Participants were asked, "How satisfied are you with your life, all things considered?"

3.2. Main Independent Variables

The main variables of interest, loss and gain, are derived from the logarithm of monthly household net income, adjusted by CPI and household size. The formulae for these variables are:

Gains:

$$\Delta y_{it}^{+} = \Delta y_{it} \text{ if } logy_{it} - logy_{it-s} > 0 \text{ otherwise } \Delta y_{it}^{+} = 0, 1 \leq s \leq 5$$

Losses:

$$\Delta y_{it}^{-} = \Delta y_{it} \text{ if } logy_{it} - logy_{it-s} < 0 \text{ otherwise } \Delta y_{it}^{-} = 0, 1 \leq s \leq 5$$

3.3. Control Variables

To address the challenge of endogeneity in happiness economics, this study employs a rigorous econometric design that incorporates time-varying control variables—such as employment status, household composition, and subjective health—to disentangle the direct pecuniary impact of income fluctuations from the non-pecuniary psychological costs of life shocks. By conditioning on these factors, the model isolates the "pure" effect of income changes, ensuring that the reported coefficients for income gains and losses are net of the contextual consequences of events like unemployment or health deterioration. This approach effectively mitigates omitted variable bias and confirms that the observed gain-loss asymmetry is driven by the income change itself relative to the individual's historical reference point, rather than the secondary effects of concurrent life events. These factors include employment status, distinguishing between individuals who are employed full-time, part-time, unemployed, or out of the labor force, as each category significantly affects well-being. Additionally, household composition captures marital and parental status, accounting for varying economic responsibilities and resource allocation within households, along with subjective health status—measured by a dummy variable ranging from poor to very good—and years of education. Despite the potential biases introduced by self-assessed health, the congruent subjective nature of both health and life satisfaction assessments suggests a potential alignment of these biases. This alignment may contribute to preserving the validity of the estimated relationship between health and life satisfaction. Additional controls include age squared and household size squared. These variables are used to capture nonlinearities in variables and are to ensure a more accurate specification with the fixed effect estimation. Year fixed effects are also included to control for macroeconomic conditions and time-specific factors. To maintain focus on the primary research topic, only a subset of results related to key independent variables is presented in the main body of the paper, with comprehensive regression findings, including control variables, available in the appendix.

4. Results

In accordance with the tests conducted in this section, the life satisfaction equations were estimated using the Fixed Effects within-group transformation estimator, with standard errors being clustered. All income-related variables were transformed into logarithmic scale, and the regression results were interpreted accordingly.[2]

2 The Fixed Effects within-group transformation estimator assumes that errors are i.i.d. distributed. This assumption is not valid in the presence of heteroskedasticity and autocorrelation. Since using the default standard errors will produce biased estimates, the analysis should be conducted with clustered standard errors in the presence of heteroskedasticity and autocorrelation (Cameron & Trivedi, 2010). We followed the same pathway, as the Modified Wald test indicated heteroscedasticity, and the Portmanteau test signified autocorrelation.

Table 6: Regression Results of Gains and Losses on Life Satisfaction

Life Satisfaction	(1)	(2)	(3)	(4)	(5)	(6)
logy	.320***	.325***	.311***	.306***	.302***	.299***
	(.01076)	(.01322)	(.01327)	(.01306)	(.01285)	(.01257)
gain_1		-.101***				
		(.015)				
loss_1		-.068***				
		(.017)				
gain_2			-.098***			
			(.014)			
loss_2			-.113***			
			(.016)			
gain_3				-.082***		
				(.014)		
loss_3				-.120***		
				(.016)		
gain_4					-.066***	
					(.014)	
loss_4					-.121***	
					(.017)	
gain_5						-.057***
						(.014)
loss_5						-.125***
						(.017)
constant	5.719***	5.692***	5.775***	5.816***	5.842***	5.857***
	(.108)	(.122)	(.123)	(.122)	(.121)	(.119)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	506779	506779	506779	506779	506779	506779
Number of groups	77,027	77,027	77,027	77,027	77,027	77,027
R-squared (within)	.090	.090	.091	.091	.091	.091

Robust standard errors are in the parenthesis.

**** p<.01, ** p<.05, * p<.1*

The results from the linear regression analysis pertaining to life satisfaction are detailed in Table 6. As indicated in the appendix, the F-test results reveal that the coefficients for the gain and loss variables, constructed based on one-year and two-year differences, are

not statistically significant from each other. However, for variables based on three-year differences, the coefficients show statistical significance at the 10% level, and even more so at the 1% level for differences spanning four and five years. Beginning with the three-year differences, there is observable statistical variance in the coefficients of gain and loss variables.

Table 7: Regression Results of Categorical Losses on Life Satisfaction

Life Satisfaction	(1)	(2)	(3)	(4)	(5)	(6)
logy	.320***	.328***	.304***	.312***	.305***	.293***
	(.011)	(.013)	(.014)	(.015)	(.016)	(.017)
loss_1		0				
		(.004)				
loss2			-.009*			
			(.005)			
loss3				-.008		
				(.005)		
loss4					-.007	
					(.006)	
loss5						-.018***
						(.007)
constant	5.719***	5.635***	5.763***	5.684***	5.734***	5.847***
	(.108)	(.126)	(.139)	(.148)	(.161)	(.177)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	506779	428634	377477	341243	301688	266842
Number of groups	77,027	60,145	51,770	44,206	39,080	35,444
R-squared(within)	.090	.093	.094	.097	.097	.097

Robust standard errors are in the parenthesis.

**** p<.01, ** p<.05, * p<.1*

The parameters for both loss and gain variables are generally significant. Increases in income, even when income is controlled for, do not positively impact life satisfaction, corroborating the findings of Di Tella et al. (2010) and Fang & Niimi (2017). The negative gain coefficients can also be observed in the study by Di Tella et al. As anticipated, the loss variables exhibit a negative sign. Starting from the three-year differences, the coefficients for losses are found to be larger than those for gains where they are statistically significant. This supports the second research hypothesis regarding the gain and loss variables. Table 6

shows that a 10% decrease in income, compared to three years earlier, leads to a 0.012-point reduction in life satisfaction.

Significantly, a four-year difference produces a similar effect in this study's context. When analyzing the regression results in relation to five-year differences, it is noted that a 10% decrease in an individual's income, compared to five years earlier, results in a 0.013-point decrease in life satisfaction. Conversely, a 10% increase in income over the same period leads to a 0.006-point decrease in life satisfaction. In summary, the regression analysis indicates that while the impact of gain variables on individuals' subjective well-being is small, ranging from 0.006 to 0.008 points, it is nonetheless negative. On the other hand, the impact of losses on life satisfaction is more pronounced, varying between 0.012 and 0.013 points. Although these effects are minimal, they are consistent with the results of similar studies. Table 7 presents the effects of loss dummy variables on life satisfaction, incorporating dummy variables to assess whether losses exert a categorical influence on an individual's well-being, regardless of their magnitude. The regression analysis reveals that losses incurred two (loss2) and five (loss5) years prior significantly reduce life satisfaction by 0.009 and 0.018 points, respectively. Interestingly, the impact of these categorical losses on life satisfaction appears more substantial than that of incremental income losses, confirming the research hypothesis that categorical losses significantly affect well-being over two- and five-year periods.

4.1. Income Groups

Table 8 details the regression analysis results for various income groups, showing that individuals with lower incomes are more sensitive to income fluctuations. Notably, those earning a monthly income of €3,501 to €5,000 are most affected by losses. Over a two-year period, individuals in the €3,501-€5,000 bracket experience the most pronounced decline in life satisfaction, with a decrease of 0.023 points for a 10% reduction in income compared to two years earlier. For the three-year interval, the lowest income group does not exhibit significant changes in response to income gains, but a 10% income drop leads to a 0.009-point decrease in life satisfaction. In the €1,251-€2,500 income bracket, a 10% increase in income results in a 0.007-point decrease in life satisfaction, while a 10% reduction causes a 0.013-point decrease.

During a four-year period, the two lowest income groups experience statistically significant declines in satisfaction by 0.006 points. Over five years, income gains do not statistically impact the two lowest-income groups, but income losses have a notable effect. For example, in the group earning below €1,250, a 10% decrease in income corresponds to a 0.006-point reduction in life satisfaction. In the €1,251-€2,500 bracket, a similar income drop results in a 0.008-point decrease, whereas the €2,501-€3,500 group remains unaffected by income changes. Conversely, in the €3,501-€5,000 bracket, a 10% income reduction leads to a 0.018-point decrease in life satisfaction.

Table 8: Regression Results of Gains and Losses on Life Satisfaction by Income Groups

Life Satisfaction	Under 1250€	1251-2500 €	2501-3500 €	3501-5000 €	5000€ and more
logy	.534***	.424***	.21***	.172***	.24***
	(.054)	(.03)	(.056)	(.06)	(.069)
gain_1	-.205***	-.086***	-.024	.035	-.074
	(.072)	(.026)	(.034)	(.036)	(.046)
loss_1	-.055	-.058**	.004	.025	-.07
	(.037)	(.028)	(.045)	(.058)	(.102)
Observations	67063	215836	111926	76840	35114
Number of groups	21,695	47873	33199	23714	11108
R-squared (within)	.089	.087	.085	.086	.074
logy	.493***	.415***	.17***	.149**	.247***
	(.053)	(.03)	(.055)	(.06)	(.068)
gain_2	-.151**	-.085***	-.003	-.078**	-.055
	(.071)	(.025)	(.03)	(.032)	(.042)
loss_2	-.109***	-.09***	-.107**	-.226***	-.015
	(.035)	(.028)	(.044)	(.061)	(.107)
Observations	67063	215836	111926	76840	35114
Number of groups	21695	47873	33199	23714	11108
R-squared (within)	.089	.087	.085	.086	.074
logy	.482***	.398***	.202***	.184***	.268***
	(.052)	(.03)	(.056)	(.06)	(.068)
gain_3	-.056	-.071***	-.034	-.028	-.08*
	(.071)	(.025)	(.029)	(.032)	(.043)
loss_3	-.082**	-.127***	-.039	-.017	.029
	(.036)	(.027)	(.045)	(.061)	(.108)
Observations	67063	215836	111926	76840	35114
Number of groups	21695	47873	33199	23714	11108
R-squared (within)	.089	.087	.085	.086	.074

logy	.488***	.4***	.207***	.167***	.254***
	(.051)	(.03)	(.056)	(.06)	(.066)
gain_4	-.036	-.008	-.027	-.063*	-.113***
	(.072)	(.026)	(.029)	(.032)	(.039)
loss_4	-.063*	-.066**	-.014	-.148**	-.119
	(.037)	(.027)	(.047)	(.062)	(.106)
Observations	67063	215836	111926	76840	35114
Number of groups	21695	47873	33199	23714	11108
R-squared (within)	.088	.087	.085	.086	.074
logy	.481***	.396***	.206***	.164***	.264***
	(.05)	(.03)	(.055)	(.06)	(.064)
gain_5	.009	-.006	-.038	-.033	-.098***
	(.079)	(.027)	(.029)	(.031)	(.037)
loss_5	-.064*	-.08***	-.036	-.118*	-.02
	(.037)	(.028)	(.047)	(.063)	(.114)
Observations	67063	215836	111926	76840	35114
Number of groups	21695	47873	33199	23714	11108
R-squared (within)	.088	.087	.085	.086	.074

Robust standard errors are in the parenthesis.

**** p<.01, ** p<.05, * p<.1*

Note: The control variables and individual and year dummies are included in all regressions.

Table 9: Regression Results of Categorical Losses on Life Satisfaction by Income Groups

Life Satisfaction	Under 1250€	1251-2500 €	2501-3500 €	3501-5000 €	5000€ and more
logy	.496***	.424***	.157***	.148**	.214***
	(.055)	(.032)	(.06)	(.063)	(.073)
loss1	.014	0	-.01	-.019*	-.001
	(.016)	(.007)	(.009)	(.01)	(.014)
Observations	53380	183793	96550	65861	29050
Number of groups	16062	38,231	27,625	19,450	8,754
R-squared (within)	.094	.089	.085	.083	.071

logy	.445***	.402***	.169***	.113*	.266***
	(.06)	(.034)	(.063)	(.068)	(.076)
loss2	-.02	-.01	-.013	-.024**	.006
	(.018)	(.008)	(.01)	(.012)	(.017)
Observations	45420	160415	86053	59124	26465
Number of groups	12992	32451	24119	17,268	7,960
R-squared (within)	.096	.091	.087	.083	.076
logy	.492***	.428***	.192***	.114	.214***
	(.063)	(.036)	(.066)	(.07)	(.079)
loss3	-.032	0	-.019*	-.006	.017
	(.02)	(.009)	(.011)	(.013)	(.018)
Observations	40968	145207	77793	53376	23899
Number of groups	11339	27956	21203	15266	7043
R-squared (within)	.098	.093	.089	.087	.079
logy	.443***	.409***	.212***	.192***	.243***
	(.069)	(.039)	(.07)	(.073)	(.085)
loss4	-.012	-.003	-.006	.001	.002
	(.022)	(.01)	(.012)	(.015)	(.021)
Observations	35519	127633	69145	47872	21519
Number of groups	9663	24283	18827	13762	6392
R-squared (within)	.096	.092	.089	.088	.079
logy	.439***	.381***	.158**	.148*	.283***
	(.072)	(.042)	(.074)	(.077)	(.088)
loss5	-.021	-.022**	-.004	-.034**	.019
	(.025)	(.011)	(.013)	(.016)	(.023)
Observations	31152	112453	61196	42701	19340
Number of groups	8386	21656	16769	12400	5831
R-squared (within)	.095	.092	.09	.093	.084

Robust standard errors are in the parenthesis.

**** p<.01, ** p<.05, * p<.1*

Note: The control variables and individual and year dummies are included in all regressions.

Table 9 illustrates the impact of loss dummies on life satisfaction, categorized by income groups. Within one-year differences, only individuals in the €3,501 to €5,000 income range are affected by categorical losses, experiencing a 0.02-point reduction in life satisfaction

from a year-over-year income decrease. Interestingly, this same income group does not show a significant response to actual losses, as outlined in Table 8.

For two-year differences, the pattern continues solely within the €3,501-€5,000 income bracket, where categorical losses are significant. For the three-year interval, the impact shifts to those earning between €2,501 and €3,500, with an income reduction correlating with a 0.02-point decrease in life satisfaction.

For five-year differences, categorical losses significantly affect life satisfaction in groups earning €1,251-€2,500 and €3,501-€5,000. Specifically, in the €1,251-€2,500 group, an income decrease over this period is associated with a 0.022-point reduction in life satisfaction. Similarly, individuals in the €3,501-€5,000 bracket experience a 0.034-point decrease in life satisfaction due to a comparable income reduction.

4.2. Robustness Check

The primary aim of this study is to examine the asymmetric effects of income changes over the past five years, with a particular focus on variations across different income groups. To enhance the robustness of our findings, we conducted a series of additional tests. In the regression analysis presented in the Results section, both gain and loss variables were included simultaneously. For robustness checks, we also conducted separate regressions for gains and losses, calculated both as annual differences and as cumulative differences in current income over the past five years. Key findings from these tests are shown in the tables below, with the full regression results available in the appendix.

Table 10: Regression Results of Gain Variables

Variable	Coeff.	p	Variable	Coeff.	p
First difference gain ($Y_t - Y_{t-1} > 0$)	-0.091	0.000	Gain compared to last year ($Y_t - Y_{t-1} > 0$)	-0.091	0.000
Second difference gain ($Y_{t-1} - Y_{t-2} > 0$)	-0.050	0.000	Gain compared to two years ago ($Y_t - Y_{t-2} > 0$)	-0.085	0.000
Third difference gain ($Y_{t-2} - Y_{t-3} > 0$)	-0.023	0.000	Gain compared to three years ago ($Y_t - Y_{t-3} > 0$)	-0.070	0.000
Fourth difference gain ($Y_{t-3} - Y_{t-4} > 0$)	-0.012	0.000	Gain compared to four years ago ($Y_t - Y_{t-4} > 0$)	-0.054	0.000
Fifth difference gain ($Y_{t-4} - Y_{t-5} > 0$)	-0.006	0.000	Gain compared to five years ago ($Y_t - Y_{t-5} > 0$)	-0.045	0.001

Table 11: Regression Results of Loss Variables

Variable	Coeff.	p	Variable	Coeff.	p
First difference loss ($Y_t - Y_{t-1} < 0$)	-0.052	0.002	Loss compared to last year ($Y_t - Y_{t-1} < 0$)	-0.052	0.002
Second difference loss ($Y_{t-1} - Y_{t-2} < 0$)	-0.047	0.000	Loss compared to two years ago ($Y_t - Y_{t-2} < 0$)	-0.100	0.000
Third difference loss ($Y_{t-2} - Y_{t-3} < 0$)	-0.025	0.000	Loss compared to three years ago ($Y_t - Y_{t-3} < 0$)	-0.110	0.000
Fourth difference loss ($Y_{t-3} - Y_{t-4} < 0$)	-0.012	0.000	Loss compared to four years ago ($Y_t - Y_{t-4} < 0$)	-0.113	0.000
Fifth difference loss ($Y_{t-4} - Y_{t-5} < 0$)	-0.007	0.000	Loss compared to five years ago ($Y_t - Y_{t-5} < 0$)	-0.118	0.000

In reviewing the gain and loss variables presented in Tables 10 and 11, it becomes apparent that the gain variables have negative coefficients. This finding is consistent with previous studies cited earlier, reinforcing the view that gains, when income is controlled for, do not have a significant positive effect on life satisfaction. Examining the annual differences, we observe that the coefficients gradually decrease, suggesting a diminishing effect over time. However, this trend is not apparent in variables based on comparisons between current income and income from previous years, particularly in the case of loss variables.

In the subsequent phase of the robustness check, we assessed the effects of experiencing consecutive years of gains or losses. Specifically, we analyzed the impact of having losses or gains over periods of 5, 4, 3, and 2 consecutive years on life satisfaction, comparing these effects with the primary findings.

Table 12: The Effect of Consecutive Gains and Losses

Variable	Coeff.	p	Variable	Coeff.	p
Yearly differences					
Mean of losses over the past five years $(Y_t - Y_{t-1} < 0 \ \& \ Y_{t-1} - Y_{t-2} < 0 \ \& \ Y_{t-2} - Y_{t-3} < 0 \ \& \ Y_{t-3} - Y_{t-4} < 0 \ \& \ Y_{t-4} - Y_{t-5} < 0)$	-0.019	0.096	Mean of gains over the past five years $(Y_t - Y_{t-1} > 0 \ \& \ Y_{t-1} - Y_{t-2} > 0 \ \& \ Y_{t-2} - Y_{t-3} > 0 \ \& \ Y_{t-3} - Y_{t-4} > 0 \ \& \ Y_{t-4} - Y_{t-5} > 0)$	-0.014	0.204
Mean of losses over the past four years $(Y_t - Y_{t-1} < 0 \ \& \ Y_{t-1} - Y_{t-2} < 0 \ \& \ Y_{t-2} - Y_{t-3} < 0 \ \& \ Y_{t-3} - Y_{t-4} < 0 \ )$	-0.040	0.005	Mean of gains over the past four years $(Y_t - Y_{t-1} > 0 \ \& \ Y_{t-1} - Y_{t-2} > 0 \ \& \ Y_{t-2} - Y_{t-3} > 0 \ \& \ Y_{t-3} - Y_{t-4} > 0 \ )$	-0.022	0.097
Mean of losses over the past three years $(Y_t - Y_{t-1} < 0 \ \& \ Y_{t-1} - Y_{t-2} < 0 \ \& \ Y_{t-2} - Y_{t-3} < 0)$	-0.053	0.003	Mean of gains over the past three years $(Y_t - Y_{t-1} > 0 \ \& \ Y_{t-1} - Y_{t-2} > 0 \ \& \ Y_{t-2} - Y_{t-3} > 0)$	-0.039	0.013
Mean of losses over the past two years $(Y_t - Y_{t-1} < 0 \ \& \ Y_{t-1} - Y_{t-2} < 0)$	-0.037	0.077	Mean of gains over the past two years $(Y_t - Y_{t-1} > 0 \ \& \ Y_{t-1} - Y_{t-2} > 0)$	-0.055	0.003

Differences taken from the current income					
Mean of losses over the past five years $(Y_t - Y_{t-1} < 0 \;\&\; Y_t - Y_{t-2} < 0 \;\&\; Y_t - Y_{t-3} < 0 \;\&\; Y_t - Y_{t-4} < 0 \;\&\; Y_t - Y_{t-5} < 0)$	-0.027	0.752	Mean of gains over the past five years $(Y_t - Y_{t-1} > 0 \;\&\; Y_t - Y_{t-2} > 0 \;\&\; Y_t - Y_{t-3} > 0 \;\&\; Y_t - Y_{t-4} > 0 \;\&\; Y_t - Y_{t-5} > 0)$	0.023	0.730
Mean of losses over the past four years $(Y_t - Y_{t-1} < 0 \;\&\; Y_t - Y_{t-2} < 0 \;\&\; Y_t - Y_{t-3} < 0 \;\&\; Y_t - Y_{t-4} < 0)$	-0.087	0.177	Mean of gains over the past four years $(Y_t - Y_{t-1} > 0 \;\&\; Y_t - Y_{t-2} > 0 \;\&\; Y_t - Y_{t-3} > 0 \;\&\; Y_t - Y_{t-4} > 0)$	-0.045	0.388
Mean of losses over the past three years $(Y_t - Y_{t-1} < 0 \;\&\; Y_t - Y_{t-2} < 0 \;\&\; Y_t - Y_{t-3} < 0)$	-0.080	0.098	Mean of gains over the past three years $(Y_t - Y_{t-1} > 0 \;\&\; Y_t - Y_{t-2} > 0 \;\&\; Y_t - Y_{t-3} > 0)$	-0.045	0.266
Mean of losses over the past two years $(Y_t - Y_{t-1} < 0 \;\&\; Y_t - Y_{t-2} < 0)$	-0.044	0.204	Mean of gains over the past two years $(Y_t - Y_{t-1} > 0 \;\&\; Y_t - Y_{t-2} > 0)$	-0.083	0.008

The first section of Table 12 presents models created by averaging the gain and loss variables based on annual differences, while the second section includes models using differences calculated from current income. Comparing the results in Table 12 with those in Table 6 indicates that the coefficients for the averages of consecutive years of gains and losses are smaller, and that some results in the second section of Table 12 are statistically insignificant. The findings reveal that both cumulative income losses and gains have a negative effect on life satisfaction, with losses demonstrating a consistently stronger impact over multiple years. Notably, the three- and four-year averages of losses show a significant effect on life satisfaction, underscoring an intensified impact of loss over time.

Table 13: The Effect of Being in a Loss or Gain State Over Consecutive Years with Dummy Variables

Variable	Coefficient	p	Variable	Coefficient	p
Yearly differences			**Differences taken from the current income**		
Loss dummy =1 if $(Y_t - Y_{t-1} < 0 \ \& \ Y_{t-1} - Y_{t-2} < 0 \ \& \ Y_{t-2} - Y_{t-3} < 0 \ \& \ Y_{t-3} - Y_{t-4} < 0 \ \& \ Y_{t-4} - Y_{t-5} < 0)$	-0.005	0.419	Loss dummy = 1 if $(Y_t - Y_{t-1} < 0 \ \& \ Y_t - Y_{t-2} < 0 \ \& \ Y_t - Y_{t-3} < 0 \ \& \ Y_t - Y_{t-4} < 0 \ \& \ Y_t - Y_{t-5} < 0)$	-0.014	0.095
Loss dummy = 1 if $(Y_t - Y_{t-1} < 0 \ \& \ Y_{t-1} - Y_{t-2} < 0 \ \& \ Y_{t-2} - Y_{t-3} < 0 \ \& \ Y_{t-3} - Y_{t-4} < 0)$	-0.001	0.812	Loss dummy = 1 if $(Y_t - Y_{t-1} < 0 \ \& \ Y_t - Y_{t-2} < 0 \ \& \ Y_t - Y_{t-3} < 0 \ \& \ Y_t - Y_{t-4} < 0)$	-0.013	0.068
Loss dummy = 1 if $(Y_t - Y_{t-1} < 0 \ \& \ Y_{t-1} - Y_{t-2} < 0 \ \& \ Y_{t-2} - Y_{t-3} < 0)$	-0.002	0.619	Loss dummy = 1 if $(Y_t - Y_{t-1} < 0 \ \& \ Y_t - Y_{t-2} < 0 \ \& \ Y_t - Y_{t-3} < 0)$	-0.014	0.025
Loss dummy = 1 if $(Y_t - Y_{t-1} < 0 \ \& \ Y_{t-1} - Y_{t-2} < 0)$	-0.004	0.346	Loss dummy = 1 if $(Y_t - Y_{t-1} < 0 \ \& \ Y_t - Y_{t-2} < 0)$	-0.006	0.227

Table 13 analyzes the impact of consecutive years of income loss on life satisfaction using dummy variables. The findings indicate that as individuals experience prolonged periods of income loss, the negative effect on life satisfaction becomes more pronounced, especially from the third year onward. While a two-year loss period shows a negative but relatively minor and less significant effect on life satisfaction—suggesting that short-term income reductions may not immediately affect well-being—by the third consecutive year, life satisfaction begins to decline significantly. This trend highlights that extended income reduction takes a noticeable psychological toll. The four- and five-year loss periods demonstrate the strongest negative impacts on life satisfaction, underscoring that prolonged income loss imposes a cumulative psychological burden that meaningfully reduces well-being. These results confirm that sustained income loss, particularly over three or more consecutive years, has a significant effect on life satisfaction.

In this section, the findings reinforce the stability and reliability of the primary conclusions regarding the asymmetric effects of income changes on life satisfaction. By analyzing gains and losses separately across various models and testing cumulative impacts, the robustness check strengthens the evidence that income losses have a substantially greater negative effect on well-being than income gains, especially when experienced over extended periods. The diminishing effects observed in annual gain coefficients, alongside the consistent, pronounced effects of cumulative losses, validate the study's focus on the psychological toll of prolonged income reduction. Additionally, the robustness tests reveal that the experience of consecutive losses has meaningful implications for subjective well-being. The models further suggest that comparisons based on current income relative to past income have a more substantial impact on life satisfaction than annual income changes. This finding implies that individuals are more influenced by how their current income compares to previous levels than by fluctuations in income over a single year. Overall, this section reinforces the main conclusions of the study—particularly the intensified impact of prolonged income loss and the limited influence of income gains—demonstrating consistency across diverse analytical models and specifications.

5. Discussion and Conclusion

This study reveals the nuanced effects of income changes on life satisfaction, demonstrating that income gains generally have an insignificant or slightly negative effect on well-being, consistent with the concept of diminishing marginal utility of income. In contrast, income losses, initially perceived as minor or less impactful than gains, show a growing influence over time, becoming statistically more significant than gains starting from the third year. This pattern suggests that the immediate impact of income losses may be buffered by factors such as consumption habits, accumulated wealth, or the perception of these losses as temporary setbacks.

Notably, categorical losses exert a more pronounced effect than the actual magnitude of losses, possibly because individuals place greater emphasis on the state of experiencing a loss rather than its size. This distinction is particularly relevant for lower-income groups, who are most affected by realized losses, highlighting the potential effectiveness of policies aimed at increasing disposable income for these segments. For instance, policy measures such as unemployment benefits, training programs, and job placement services could be crucial in mitigating the impacts of income losses, particularly for those impacted by job losses or economic downturns. From a policy perspective, the importance of adopting time-sensitive approaches is underscored. Immediate recovery measures may be more effective in offsetting the negative impact of income losses. The persistence of consumption levels despite income declines risks savings depletion and household indebtedness, necessitating prompt and effective policy interventions.

Loss aversion has garnered significant attention and acceptance since its introduction to literature by Tversky and Kahneman as a critical component of Prospect Theory. However,

recent studies suggest that loss aversion may not be as prevalent in both risky and risk-free choices as previously thought. For instance, various studies have not observed loss aversion in bets conducted in recent years (Erev et al., 2008; Ert & Erev, 2013; Mukherjee et al., 2017; Rakow et al., 2020; Spektor et al., 2023; Walasek & Stewart, 2015; Yechiam & Hochman, 2013; Zeif & Yechiam, 2022). In studies where individuals were asked to evaluate the impact of losing and winning certain objects, evidence for loss aversion is weak when stakes are low, while the effect is observed when stakes are relatively high (Harinck et al., 2007; McGraw et al., 2010; Mukherjee et al., 2017; Rozin & Royzman, 2001). Gal and Rucker, (2018), did not find a loss aversion effect in individual evaluations conducted on everyday items.

Gal and Rucker (2018) argue that choices attributed to loss aversion are confounded with inaction, and that no endowment effect is found when controlling for inaction and decomposing the decision whether to act and the loss/gain decisions. According to Gal (2006), individuals may choose not to change their status quo in riskless choices because taking action requires more motivation, information processing, and transaction costs, or because the cost of mistakes in changing the status quo is higher than the cost of mistakes in inaction (regret). The endowment effect, often seen as a manifestation of loss aversion in risk-averse choices, can similarly be explained by the inaction factor (Gal & Rucker, 2018). If individuals are not motivated to exchange, they may prefer to stick with their current option. Another explanation for the endowment effect involves different reference points for the parties involved. For sellers, the market value is the most salient reference point, while for buyers, the most salient reference point is the benefit they will receive (Isoni, 2011; Weaver & Frederick, 2012). Considering these discussions, some researchers have concluded that loss aversion is context-dependent rather than a generalizable principle (Ert & Erev, 2013; Gal & Rucker, 2018). Our study does not directly test loss aversion through active choices. However, the fact that negative changes in income over the years are only effective at certain lags may be related to the context-dependency of loss aversion.

However, this study faces limitations, including its inability to establish causality due to the dataset's unbalanced nature. It remains unclear whether decreases in income cause reductions in life satisfaction or vice versa. Although the stability of life satisfaction assessments within the group somewhat mitigates this issue, future research should more definitively aim to establish causality.

Another limitation is the dataset's unsuitability for dynamic analysis. Future studies might delve into the origins and perceptions of income changes to better understand the short-term resilience to losses and investigate factors like optimism and compensability for deeper insights into individuals' reactions to income fluctuations.

In summary, our findings highlight asymmetric effects of income changes, particularly over the medium term and more significantly for lower-income groups. The larger impact of categorical losses compared to actual losses provides critical insights for policy formulation. Policymakers could improve individual and household welfare by focusing on increasing income for low earners, supporting those experiencing income losses, reducing income inequality, and devising policies that leverage loss framing to enhance financial decision-making.

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Authorship.

Ozge Selvi Yavuz: Conceptualization, data collection, data curation, methodology, formal analysis, software, writing – original draft.

Devrim Dumludag: Conceptualization, methodology, formal analysis, writing – review and editing.

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Replication Materials. Replication Materials. The data used in this study are from the German Socio-Economic Panel (SOEP), which is publicly available for scientific research through the DIW Berlin. Information on data access can be found at: https://www.diw.de/en/diw_01.c.615551.en/research_infrastructure__socio-economic_panel__soep.html

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