T.C.

TURKISH-GERMAN UNIVERSITY

INSTITUTE OF SOCIAL SCIENCES

INTERNATIONAL FINANCE DEPARTMENT

GENDER EFFECT ON RELATIVE CONCERNS

MASTER'S THESIS

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İstanbul, October 2024

DEDICATION

I would like to thank Dr. Levent Yılmaz for his support during the consultancy process of the thesis. I cannot thank enough to my dearest PhD-to-be friend Zeynep Beyza Ağırsoy and Dr. Muhammed Emin Karaarslan, who are just a phone call away, waiting with excitement to share all their experiences. Thanks to my beloved family, who stood behind me like a big mountain as always while all this was happening.

This thesis could not have been written if Prof. Dr. Alpaslan Akay had not stepped in. Throughout our study together, he has given me a great inspiration to pursue a curiosity, to increase my excitement every day to live and to educate myself, in addition to the scope of the thesis. I will always be grateful to him for entrusting me with this wonderful wisdom.

ABSTRACT

This thesis investigates whether there is a gender difference on the relative income effect, evaluated using subjective well-being data as a proxy for individual utility. The data set we use is a cross section of SOEP (the Socio-Economic Panel) of Germany collected during the last decade (2010-2019). We estimate subjective well-being regressions in which we control for the absolute level of income, relative level of income, as well as other determinants of well-being including age, years of education, family variables among others. We split the data in two parts by gender. Then, we analyze how females and males compare their income with other females and males. Our result suggest that females compare more with females compared to what they do with other comparable males. However, males compare more with other males, but they do not compare with other females. Overall, we conclude that males are more affected by income comparisons than that of females. This information should be used more in welfare related public policies.

Key Words: Income comparisons, Gender effect, SOEP, Relative concerns

ÖZET

Bu tez, göreli gelirin bireysel refah üzerindeki etkisinde cinsiyet farkı olup olmadığını araştırmakta ve bireysel refahı değerlendirmek amacıyla öznel refah verilerini kullanmaktadır. Kullanılan veri seti, Almanya'da son on yılda (2010-2019) toplanan SOEP (Sosyo-Ekonomik Panel) verilerinden oluşmaktadır. Mutlak gelir düzeyi, göreli gelir düzeyi, yaş, eğitim süresi, aile yapısı gibi diğer refah belirleyicileri dikkate alınarak öznel refah üzerindeki etkiler çeşitli regresyon analizleri ile tahmin edilmiştir. Veriler, cinsiyete göre iki gruba ayrılmış, kadın ve erkeklerin gelirlerini diğer kadın ve erkeklerle nasıl karşılaştırdıkları incelenmiştir.

Sonuçlar, kadınların gelir karşılaştırmalarını daha çok kadınlarla yaptığını, erkeklerin ise daha çok kendi aralarındaki karşılaştırmalara odaklandığını göstermektedir. Erkekler genellikle erkeklerle karşılaştırma yaparken, kadınlarla gelir karşılaştırması yapmamaktadır. Genel olarak, erkeklerin gelir karşılaştırmalarından kadınlara oranla daha fazla etkilendiği sonucuna ulaşılmıştır. Bu bulguların refah politikalarında daha fazla göz önünde bulundurulması gerektiği önerilmektedir.

Anahtar Kelimeler: Gelir karşılaştırmaları, Cinsiyet farklılıkları, SOEP, Göreli endişeler

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1. INTRODUCTION

Relative concerns towards income can be broadly defined as concerns about the income levels of other people's income positions that are comparable (Ferrer-i-Carbonell, 2005; Luttmer, 2005). That is, the central focus of this area of research is how people compare their income or consumption with each other. One of the assumptions of utility theory basically is that more is better. Therefore, an increase in income in absolute terms is desirable from an individual's point of view. The neo-classical economic model proceeds on the assumption that individuals' utility is only a function of their own income and consumption. To put this in technical terms, earning more in absolute terms allows greedy consumers to reach a higher indifference curve. According to this approach, if people are utility maximizers, then they should only consider what they have. However, recent studies in this field show that absolute income is not the only determinant of individuals' utility. In fact, several studies in this area have concluded that the correlation between absolute income and subjective well-being (SWB hereafter) is rather lower than expected. It is concave and follows the idea of diminishing marginal returns (Clark & Oswald, 1996; Frey & Stutzer, 2002). Literature also suggests that people tend to compare their income with others, i.e., status concerns or relative concerns (Frank, 1985; Clark et al., 2008). The phenomenon of relative concerns has been investigated using SWB datasets by using proxies of SWB, such as life satisfaction and happiness, as the experienced utility functions. Relative concerns have a significant impact on individuals' happiness. For individuals, one of the most important factors affecting their well-being and SWB levels is the income levels of the people around them (Boyce & Wood, 2011; Brown et al., 2008). The main finding is that if people around us are getting richer, we tend to lose well-being, meaning that we are getting "unhappy" by the appreciation of other people's income (Clark et al., 2008; Ferrer-i-Carbonell, 2005). Also, the literature aims to figure out which group of people are more affected by these sorts of concerns. One important and underexplored characteristic is the "gender". In this study, we

would like to explore whether there is a gender effect on relative concerns and whether people make income comparisons "across" genders (e.g., male vs. female and male vs. male).

In recent years, women have made progress in many areas from different perspectives. The reduction in the gender pay gap, the increase in educational attainment, and the reduction in women's workload within the house due to technological advances in household appliances are

the first and most influential ones that come to mind. With these changes and improvements, women have been able to increase their freedom both within their houses and in the labor market during the last decades. Women's access to better market conditions has also increased their opportunities outside marriage, which has contributed positively to their bargaining power. It can be argued that these social changes in recent decades have increased women's opportunities and had a positive impact on women's SWB (Stevenson & Wolfers, 2009).

Alongside the favorable developments for women mentioned above, the relative increase in women's participation in the labor market over the last half-century has had economic and social consequences. In this context, gender identity inherently affects economic decision-making. To remain or not to remain within the frameworks provided by certain social norms may create costs. The existence of social norms created by gender roles, such as "a man should earn more than his wife" or "women work at home, and men work in the labor force", may lead to women participating less in the labor force or working in jobs where they earn less than their potential income or earn less than their husbands (Bertrand et al., 2013). We argue that these facts recreate relative concerns towards income for women through the perspective of gender identity. Therefore, we think that measuring the effects of relative concerns of income on women's and men's SWB will contribute to the literature.

To identify the gender effect on the relative concerns, we start our analysis by following the general literature, which uses SWB to explore relative concerns. Literature uses panel datasets such as SOEP (The Socio-Economic Panel) or other long panel datasets from different countries. In this thesis, we use the last ten years of SOEP just before the Covid-19

pandemic (2010-2019) because the pandemic might affect the relative concerns in the population. We follow the extant literature to define the reference groups and the comparison income for each individual. The papers such as Ferrer-i-Carbonell (2005), define arbitrary reference groups to determine what people actually compare. These studies determine some characteristics such as age, gender, education, and region to find people whom people potentially compare their own income with. We use the same strategy. The contribution of this study is that first, we estimate the relative income effect using SWB data, and then we split the analysis for males and females to determine which groups' SWB is affected more when their relative income is appreciated. Finally, we allow for cross-comparisons between genders.

The wide time span covered by the dataset provides a solid basis for panel data analysis and gives us the opportunity to observe temporal changes. This approach provides a more nuanced view of how individuals' circumstances and life experiences evolve over time. The model specification is a fixed effects panel data model. This model helps to include unobserved individual features that independently affect SWB and relative concerns. Then, we compare this methodology with a pooled OLS. The results are highly different and show that a fixed-effect model is necessary. We split the data for males and females. About fifty per cent of the data is females and males, as expected. The sample size used in the analysis for females and males is then about the same. We investigate relative income on SWB for females by assuming that they compare with other comparable (in age, education, region, over time) females and also males. We then do the same for males. The comparison of the estimated relative income relation suggests that the magnitude of the relation is larger for females, implying that their well-being is more influenced by relative concerns, especially when they compare their income with other females.

The rest of the thesis is written as follows: We first give the literature analyzing relative income on SWB and gender effect studies as a subcategory. We also discuss some conceptual issues, such as why we expect males and females to have different relative income effects. Then, in Section 3, we will give the SOEP data and the sample that we use. In the

same section, we will talk about the methodology. Section 4 gives the estimation results. Section 5 discusses the results and concludes with a discussion of policy implications.

2. LITERATURE AND HYPOTHESIS

2.1. Background and Previous Relative Income Literature

There is a bulk of studies in psychology and economics literature investigating the different aspects of the relative concerns for decades. Even in the earliest works in economics, we find many references to the phenomenon of relative concerns. For example, Adam Smith, who put forward the basic theories of economics, wrote: "Nothing is so mortifying as to be obliged to expose our distress to the view of the public, and to feel, that though our situation is open to the eyes of all mankind, no mortal conceives for us the half of what we suffer. For to what purpose is all the toil and bustle of this world? What is the end of avarice and ambition, of the pursuit of wealth, of power, and preeminence? Is it to supply the necessities of nature? The wages of the meanest laborer can supply them. We see that they afford him food and clothing, the comfort of a house, and of a family. If we examined his economy with rigor, we should find that he spends a great part of them upon conveniences, which may be regarded as superfluities, and that, upon extraordinary occasions, he can give something even to vanity and distinction." (Smith, 1790).

As we understand from Adam Smith's famous work, studies in this field go back almost three hundred years. However, we can still say that organized, systematic and methodologically sound studies are very recent. Both theoretical and empirical studies in the SWB literature have started to find a place for themselves more in recent years. Empirical studies using data obtained from individual well-being measurement surveys, which are important for both psychologists and economists, have provided strong evidence on the relationship between SWB and human behavior. With the acceptance of self-reported SWB data as a direct explanation for utility, the outcomes of studies in this field have created opportunities as a complementary and alternative for social policy making.

One of the most well-known study focusing on the phenomenon of relative concerns is Easterlin (1974). In this study, contrary to the classical economic theory, it was argued that happiness may not increase with the increase in income. To support this claim, the reports of surveys from 1946 to 1970, covering nineteen countries, eleven each in Asia, Africa and Latin America, were used to analyze individuals' statements about their SWB. According to the results of the study, there was a significant positive correlation between income and happiness across countries, with those in the highest status group being happier on average than those in lower status groups. However, as economic conditions and norms change over time, the positive correlation between income and happiness weakens.

Another study covering the relationship between relative income and utility from early years is Clark & Oswald (1996). In this study, they tested the hypothesis that happiness is more affected by income in relative terms rather than absolute terms. They used a dataset called the British Household Panel Study (BHPS), which consists of a sample of about 10,000 people and includes detailed information on job satisfaction. Two important findings emerged from the study. The first finding is that there is a negative relationship between employee happiness and relative income. The second important finding of the study is that there is a negative relationship between education level and happiness in the cases of holding income constant. The reason for this is interpreted as being that expectations of income increase as the level of education increases. So, in the higher levels of education, income is not enough to meet the expectations raised from higher aspirations. This study was published relatively early in the field of relative concerns and made a significant contribution to the literature in this sense. Another important issue that the study points to is the high potential of satisfaction statistics, which economists did not widely use at the time of its publication.

Clark et al., (2008) provides an overview of the SWB literature and provides an overview of the new studies added to the literature after Easterlin (1974). In the study, the "Easterlin Paradox"" which is frequently cited in the literature with the Easterlin (1974) study, that is, although real income is increasing in developed countries, the increase in

happiness is not so significant, and the literature studies are harmonized. The important contribution of the paper to the literature is that it goes beyond the Easterlin Paradox by trying to develop theoretical economic models between the SWB literature and taxation, labor supply, economic growth, saving, wage profiles, migration and consumption. It has been argued that utility functions including relative income terms produce testable predictions of both welfare and observable behavior. Moreover, tests of these predictions not only combine theory and empirical analyses but also create an interdisciplinary field of study. It is concluded that taking relative income seriously is an important step towards greater behavioral realism in economics, so that models and empirical analyses of an uncertain concept such as utility offer a closer approximation to how real people behave.

Another study examining the relationship between income and SWB is Kahneman & Deaton (2010). In this study, the concept of subjective well-being is approached from two different perspectives as emotional well-being and "evaluation of life", where emotional well-being is defined as the emotional quality of an individual's daily experiences and evaluation of life is defined as people's general thoughts about their lives. In this study, which simply seeks to answer the question "Does money buy happiness?", it was revealed that emotional well-being and evaluation of life have different correlations. According to the results of the study, which analyses more than 450,000 responses to the Gallup-Healthways Wellbeing Index with 1,000 people living in the USA, it was found that while there was a steady increasing relationship between increasing income and evaluation of life, emotional well-being did not increase more in the parts where income exceeded approximately $ 75,000 per year. As a result of the study, it has been concluded that high income "purchases" evaluation of life, but it is not enough to "purchase" emotional well-being.

Luttmer (2005) examines the relationship between relative income and SWB based on "change in the neighborhood" and provides evidence that SWB is partly dependent on relative position. Using data on individuals from the 1987-1988 and 1992-1994 waves of the National Survey of Families and Households (NSFH), the paper maps information on local earnings in so-called Public Use Microdata Areas with an average population of 150,000 to

panel data on self-reported happiness, other measures of well-being and characteristics. The analysis shows that a one standard deviation (0.27) increase in neighbors' earnings reduces self-reported happiness by 0.065 or 6% of one standard deviation. This result provides strong evidence that individuals' happiness is negatively affected by the earnings of others in their neighborhood. It was also found that an increase in neighbors' earnings and a decrease of similar magnitude in own earnings have a similar negative effect on well-being and the result is statistically significant.

In her study, Ferrer-i-Carbonell (2005) shared the empirical test results of four important hypotheses used in the literature regarding the importance of comparison income for SWB. The study, in which the GSOEP panel data set is used, and the estimation results are presented with a distinction between East and West Germany, has contributed to the empirical studies in the literature. What distinguishes the study from the literature in this field is that it tested the comparisons between income and SWB through 4 different hypotheses: family income, the income of the reference group, the difference between the individual's own income and the average income of the reference group and the direction of income comparisons. In the study where the SWB estimation was performed with by means of an Ordered Probit model with individual random effects, the regression includes many dummies such as education, employment status and age. From the results of the empirical analysis; (i) the effect of income on SWB is small and statistically significant, (ii) the effect of income on SWB is more significant for East Germans than for West Germans, (iii) the same increases in the reference group and family income do not lead to a significant change in SWB, (iv) the higher the individual's own income is than the average income of the reference group, the happier the individual is, and (v) the comparison is asymmetric for the western and total German sample.

As a subcategory to relative concerns, there are also published studies in SWB and gender, although their number is not as abundant. Stevenson and Wolfers (2009) focused on the positive changes in women's social and economic conditions, especially in the last 40 years. The study emphasizes that women's lives have become more complex as their

participation in the labor market has increased. Therefore, the happiness reported by housewives and working women may differ. While the focus is on the happiness of housewives in the home, it is noted that the concept of happiness for working women is the sum of their happiness in more than one area. Since happiness for working women is obtained by combining satisfaction in two different areas, namely satisfaction at work and satisfaction at home, it has become difficult to achieve a certain level of satisfaction. This has led to a decline in average satisfaction. In addition, women's increased opportunities to succeed in more than one environment means that they compare their status with a wider audience, including men and thus increase the likelihood of being unhappy. In this way, the study addresses the paradox that women's happiness has declined in recent years while their social, family and labor market opportunities have improved.

One of the studies that has contributed to the literature by adding a household perspective to gender and relative income studies is the study by Bertrand et al. (2013). This study emphasizes that the gap between women and men in terms of income and participation in the labor market has narrowed over the last 50 years as a result of a shift in labor demand towards sectors in which women's skills are better represented, labor market regulation, competitiveness and important regulatory and technological developments such as the contraceptive pill. The study examined the relationship between gender norms and relative household income. The research analyzed the relative income distribution of young married couples between 2008 and 2010, provided by the American Community Survey, where the wife's age range is 22-31 and the husband's age range is 24-33. According to the research, while both women and men prefer high-income spouses, it was observed that divorce rates increase in marriages where the woman earns more than the man. Furthermore, the 23 per cent decline in marriage rates between 1970 and 2010 was explained by the fact that women started to earn more than men. It has been observed that when women marry men who earn less than they do, they either choose to stay at home or take lower-paid jobs. The research suggests that the behavioral norm that "a man should earn more than his wife" still explains economic and social outcomes even in the last decade, but it also emphasizes that this norm is not as strong as it used to be.

2.2. Conceptual Framework and Hypothesis

2. 2. 1. Framework

The conceptual framework for this study is based on the theory of SWB and relative income effects. Subjective well-being, often used as a proxy for individual utility, is a comprehensive measure that includes emotional responses, domain satisfaction, and global judgments of life satisfaction. The theory posits that well-being is influenced not only by absolute income but also by relative income, i.e. the income of an individual compared to others in his or her reference group. The concept of relative concerns is based on the idea that individuals are influenced not only by their own economic and social status but also by the status of others as a result of comparing their social and economic status and at the same time, competing with each other.

In this context, in addition to income and social status, various socio-economic variables such as age, education, health and family can be considered as relative concerns. In essence, these factors interact to form a whole, and it is this whole that determines an individual's overall happiness and life satisfaction. Within this whole, income, especially relative income, plays an important role because individuals compare their economic status with other people they interact with in their social environment. This constant comparison creates a mechanism that can lead to changes in one's sense of self, place in society and level of satisfaction, thereby affecting well-being.

Our focus in this thesis is to analyze the relationship between relative income and happiness from the perspective outlined above, and to conclude whether gender plays a role in this mechanism. When we bring together the concepts of gender roles, income and happiness, we are talking about a complex web of interactions. Gender norms also play an important role in determining the economic and social roles of individuals. If we look at these norms, which have different frameworks for men and women, we see that for men providing

for the family is associated with being the 'breadwinner', while for women it is associated with taking on the responsibilities of domestic life and 'working at home'. Because of these roles, there are differences in the way men and women associate happiness with income. For men, high income is the determinant of happiness, whereas working women, in particular, try to achieve happiness through a more complex balance between home and work. (Stevenson & Wolfers, 2009)

In modern society, however, we can observe various flexibilities in gender roles. While the image of the 'working woman' is being normalized with the increase in women's participation in the labor force, we can observe that men have begun to normalize the image of the 'man at home' by contributing more to housework and childcare. Changing gender dynamics may also lead to changes in the relationships between income and happiness constructed by men and women. The results of studies that analyze these changing relationships may be important for taking some steps towards social well-being. For example, policies or incentives that promote a balanced division of domestic and work responsibilities between women and men could lead to higher levels of well-being for society as a whole.

2.2.2. Hypothesis

The main hypothesis that we focus on in this thesis is that there are gender differences in the absolute and relative income effect on subjective well-being (e.g., life satisfaction in our case). The second hypothesis that we test is that there might be differences in the income comparison effect when males and females cross compare. As we discussed above, we expect that women are more likely to compare their income with other comparable women than they compare with comparable men. On the other hand, men are expected to compare with other man as well but with less to with other comparable woman. Third, we also argue that there is heterogeneity in the results, especially among people of particular ages and employment statuses, which generates different socioeconomic and psychological patterns. For example, we expect that prime-age women who are not active might experience a higher level income comparison effect as they do not have an opportunity to catch up with the income of another

woman. Finally, we also consider that the reference group definition might be important in the determination of the relative income effect.

To test these hypotheses, the analysis involves estimating well-being regressions, where subjective well-being is regressed on absolute income, relative income and other control variables. By splitting the data by gender, we can examine the different patterns in income comparisons for men and women. Our main focus is to determine whether there is a gender effect in the relationship between relative income and subjective well-being. This involves examining whether the impact of relative income on SWB differs between men and women. By exploring this interaction, we aim to uncover potential differences in how income comparisons affect the well-being of different genders. This analysis is crucial for understanding the wider implications of economic inequality and social comparison processes. It can also provide valuable insights for policymakers seeking to address gender-specific factors that influence SWB and overall quality of life. Using the comprehensive and detailed data provided by the SOEP, our regression model aims to analyze the multifaceted nature of happiness. We will use the data between the years 2010 and 2019, ending in 2019 to avoid the unexpected and disruptive nature of the pandemic. The panel structure of the data allows for the control of time-invariant individual characteristics through fixed effects models, thus providing more precise estimates of the effects of the independent variables. This analysis not only contributes to the understanding of the socio-economic determinants of happiness, but also provides policy-relevant insights into how to improve subjective well-being. The results of this study can help inform policies aimed at improving quality of life, reducing health inequalities and promoting social and economic equality.

3. DATA

3.1. Data Sources

We use Socio-Economic Panel (SOEP). It provides data for conducting comprehensive analyses of various aspects of individual and household behavior over time. Established in 1984 by the German Institute for Economic Research (DIW Berlin), the SOEP is a longitudinal study that covers a wide range of socio-economic variables, making it an invaluable resource for researchers. The dataset includes detailed information on demographics, employment, income, education, health, and life satisfaction, collected annually from a representative sample of households in Germany. This rich data structure allows for in-depth longitudinal analyses and the investigation of complex relationships between variables.

For this thesis, we use the panel aspect of SOEP. The dataset also contains data on personal income, to investigate the determinants of SWB. As the focus of regression analysis is to understand how absolute and relative income of man and woman differentially affect subjective well-being, this information is crucial. The dependent variable in the model is the SWB measured with life-satisfaction as explain in detail below. The key independent variables include age, health, education, gender, relative income, and marital status. These variables are chosen on the basis of their theoretical relevance and empirical importance in influencing subjective well-being (Dolan et al., 2008).

3.2. Data Preparation

First of all, the analysis is confined to the years between 2010 and 2019. The year 2020 is excluded due to the potential impact of the COVID-19 pandemic, which could introduce significant outliers and biases in the data. Then, we restrict our sample to people who are in between 18 and 80. Only native respondents are included in the analysis, and those with a direct migration background (first-generation) are excluded. This ensures the focus remains on the native population without migration influences. Since migration might

create different influences on relative income and the effectiveness of the analysis, excluding these groups helps in obtaining more precise and relevant results for the native population. We think that this is a topic of another thesis.

The model below uses a set of independent variables which are found to be important for SWB in the literature. We use age and squared age to capture U-shaped relationship between age and well- being (Dolan et al., 2008). We also control for marital status in five dummy variables as single, married, divorced, widowed, and separated, Western Germany dummy, household size, number of children, health status in five dummies, employment status, working hours and Federal States of Germany (16 dummies). Finally, we also control for education variable defined as the years of education.

3.2.1. Absolute and Relative Income

The income is the key variable for this study. The absolute income level of an individual is all the income obtained by the household members as an individual consumes together with the other members. The income is the net household income obtained after governmental social security transfers. The relative income is created using this variable. To do this, we created reference groups that we think individuals compare their income with. The relative income or the reference income used in this thesis the average income of people in the reference groups. The reference groups are created by using several criteria. The first is the age groups

- Age group=1 for individuals younger than 30
- Age group =2 for those aged between 30 and 40
- Age group =3 for individuals aged between 40 and 50
- Age group =4 for those aged between 50 and 60
- Age group =5 for respondents aged between 60 and 80

The relative income levels are calculated for each year in the study to make them

change over time. We also calculate the mean income for males and females in different variables. This helps us to investigate how a man compares with other men and women and how a woman compares with other women and men.

Also, to investigate how the results differ for the criteria used in the reference groups, we add some other variables in different definitions. One important criteria is education, which is implemented in the reference groups as two categories.

- Education=1 for individuals educated less than 12 years
- Education=2 for those educated more and equal to 12 years

Finally, we add 16 Federal states to get narrow regions, married individuals and good health or bad health individuals.

3.3. Descriptive Statistics

First, we investigate our dependent variable, SWB or life satisfaction closely. The SWB is measured in 0-10 points. The average level of SWB is 7 in Germany. In the overall distribution, the majority of the sample rated their happiness as 7 or 8, representing 20.7 per cent and 33.95 per cent of the total sample. On this basis, we can say that a significant proportion of the population report their happiness as relatively high. If we look at the cumulative percentages, we see that 79 per cent of people report their SWB between 0 and 8. The distribution of life satisfaction for males and females are given in Figure 1. Looking at the distribution of happiness between men and women, there are slight differences. While the average happiness of women is 7.29, men are slightly happier with an average of 7.31.

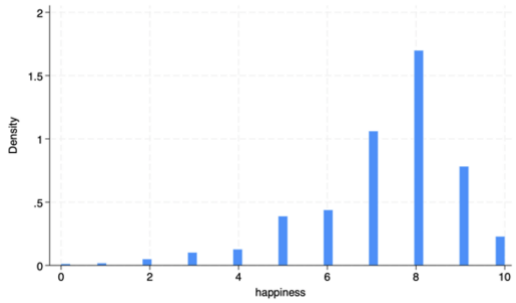

Figure 1. Distribution of Life Satisfaction of Females

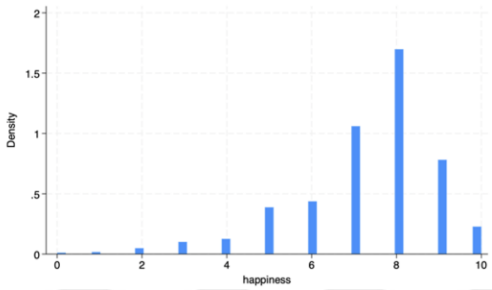

Figure 2. Distribution of Life Satisfaction of Males

The Table 1 presents the descriptive statistics. The descriptive statistics provide a detailed summary of the key variables of the study for the total sample, women and men.

Table 1. Descriptive Statistics for Sample

Variable	Observation	Mean	Std. dev.	Min	Max
Age	221.501	48,2411	1,6419	18,00	80,00
Happiness	198.587	7,2999	1,6943	0	10,00
Education	193.324	12,7212	2,7455	7,00	18,00
Household size	221.501	2,8367	1,3458	1,00	14,00
Household income (in log)	221.476	10,5155	0,6599	0	15,90
Working hours	202.111	23,1724	2,0388	0,40	105,00
Employment Status	221.501	0,6200	0,4854	0	1,00

Table 2. Descriptive Statistics for Males

Variable	Observation	Mean	Std. dev.	Min	Max
Age	105.214	48,4932	1,6633	18,00	80,00
Happiness	91.703	7,3100	1,6638	0	10,00
Education	88.964	12,8509	2,8034	7,00	18,00

Household size	105.214	2,8941	1,3579	1,00	14,00
Household income (in log)	105.207	10,5701	0,6464	0	15,90
Working hours	93.397	28,3716	2,1786	0,50	100,00
Employment Status	105.214	0,6344	0,4816	0	1,00

Table 3. Descriptive Statistics for Female

Variable	Observation	Mean	Std. dev.	Min	Max
Age	116.276	48,0148	1,6220	18,00	80,00
Happiness	106.878	7,2913	1,7198	0	10,00
Education	104.355	12,6105	2,6903	7,00	18,00
Household size	116.276	2,7848	1,3326	1,00	11,00
Household income (in log)	116.258	10,4661	0,6680	0	15,90
Working hours	108.708	18,7065	1,7941	0,40	105,00
Employment Status	116.276	0,6071	0,4884	0	1,00

The descriptive statistics provide a detailed numerical summary of the main variables of interest for this study, both for women and men and for the population as a whole. In the data we used, the age of the individuals ranged from 18 to 80, with an average age of 48.24. The average happiness score for the sample was 7.30, ranging from 0 to 10. From this score we can interpret that the average happiness is relatively high. While years of education vary between 8 and 18, the average year of education is 12.72. The average size of a household is 2.84. Another important data for our study is the data on employment. While 62 per cent of our sample is employed, the average household income is log 10.52 and the average weekly working hours are 23.17.

In the analyses conducted for men and women, differences stand out. While the average age of men in the sample is 48.49, it is 48.01 for women. While the average happiness score of men is 7.31, it is 7.29 for women. From this data, it is seen that men are slightly happier than women on average. When we look at the duration of education, it is seen that women have received an average of 12.61 years of education, while men have received more education than women with an average of 12.85 years of education. Differences are also observed in the data on employment. With 63% men exceeded women's employment rate of 61%. In parallel with this, while the average weekly working hours of men is 28.37, the

average weekly working hours of women is 18.71. When we look at the average income, women earn a logarithmic income of 10.47, while men earn 10.57. From this data, we can deduce that men earn approximately 10.52 per cent more than women.

3.4 Reference and Cross-Reference Groups

3.4.1. Reference Groups

In order to properly analyze our hypotheses in this thesis, it is necessary to construct a robust econometric model in which relative income is correctly calculated. In this context, it is crucial to define and elaborate the reference groups. While the reference groups represent homogeneous subgroups according to the socio-economic characteristics of the individuals in the population we are using, the relative income to be calculated for each individual can be based on the average income of that individual in the group with similar socio-economic and demographic characteristics. To this end, we aim to observe the relationship between SWB and income more precisely by abstracting the effects of different variables by creating more than one reference group. For example, variables such as age, gender, education, marital status and health may influence the SWB of individuals in such a way that there is a noticeable difference. Therefore, analyzing the impact of each of these variables on relative income and SWB will only be possible by creating different reference groups. In this way, we believe that we will be able to obtain reliable and comprehensive results while providing a multidimensional approach to our analyses. Our reference group is defined as “all people with similar age, similar gender, similar education, living in the same federal state during each year”. We use post-governmental household income as the income source. Then, we calculate the mean income as the reference income level using the criteria above A similar reference group definition is also used in Ferrer-i-Carbonell (2005).

3.4.2. Cross-Reference Groups

In addition to reference groups, cross-reference groups are also defined to calculate

relative income by gender. Cross-reference groups allow the average income of men and women in each reference group to be calculated on the basis of the reference groups we defined earlier. The construction of these groups is necessary to analyze in detail how relative income differs by gender and how its impact on SWB varies by gender. Using the same criteria, we calculate the reference group among males and females and used in the regression of males and females.

4. ECONOMETRIC MODEL

In this section, we will present the models we have built to examine the relationship between individuals' SWB levels and income and then add a gender into analysis. The main purpose of the analysis is to measure the effect between relative income and SWB together with variables that we believe have important effects on SWB such as age, education, gender, health status, region of residence, and year of observation. This hypothesis, which is discussed in the literature, suggests that individuals' happiness is affected not only by their absolute income level but also by the income of other individuals around them, i.e. relative income. In order to test this hypothesis, we will use Ordinary Least Squares (OLS) and fixed effects models including the control variables mentioned in the previous section.

4.1. Simple OLS-Regression

The simple OLS model is a widely used method for understanding the relationships between the dependent variable and independent variables. The main advantage of the OLS model is that it is relatively easy to apply and interpret the results. This model was used as a first step to analyze general trends and relationships in the data.

$$\begin{aligned} LS_i = \beta_0 + \beta_1 \text{female}_i + \beta_2 \text{age}_i + \beta_3 \text{marital}_i + \beta_4 \text{educ}_i + \beta_5 \text{west}_i + \beta_6 \text{hsize}_i + \beta_7 \text{nofch}_i \\ + \beta_8 \text{curhealth}_i + \beta_9 \text{emp\_stat}i + \beta_{10} \text{workh}i + State_s + Year_y + \beta_{11} \text{a\_linc}i \\ + \beta_{12} \text{r\_linc\_overall}_i + \epsilon_i \end{aligned}$$

This model includes the basic variables that affect the life satisfaction levels of individuals and that we have discussed before. In the model, LS stands for life satisfaction. There are several independent Variables including gender (female), age (age), marital status (marital), education (educ), living in western region (west), household size (hsize), number of children (nofch), current health status (curhealth), employment status (emp_stat), working hours (workh), year (year), state (state), absolute income (a_linc), relative income (r_linc_overall). These variables represent various demographic, economic, and social factors that affect individuals' levels of SWB. Control variables isolate the effects of other variables and allow the model to more accurately measure the independent effects of income variables on life satisfaction. The model also includes the federal state and year dummies to capture region and year effects on LS. Finally, the model includes an error term (ϵ_i).

4.2. Fixed-Effects Model

The fixed-effects model provides a way to control for time-invariant characteristics when a panel data set is used. This model controls for individual heterogeneity by using observations of individuals over time, which is important in providing more reliable and consistent estimates. The fixed effects model we used in our analysis observes individuals' SWB levels as they change over time but aims to provide more consistent and reliable estimates by removing individuals' unchanging characteristics from the model. This model more clearly analyses the effects of variables over time by controlling for the unique fixed characteristics of individuals. While the model can observe the effect of income changes over time on individuals' SWB, it can also observe the interactions with demographic variables such as gender, education level and age. Individual characteristics that do not change over time are removed from the model and controlled by fixed effects (α_i).

$$\begin{aligned} \mathrm{LS}it = \alpha_i + \beta_1 \mathrm{marital}it + \beta_2 \mathrm{educ}it + \beta_3 \mathrm{west}it + \beta_4 \mathrm{hsize}it + \beta_5 \mathrm{nofch}it + \beta_6 \mathrm{curhealth}it \\ + \beta_7 \mathrm{emp\_stat}it + \beta_8 \mathrm{workh}it + State_s + Year_y + \beta_9 \mathrm{a\_linc}it \\ + \beta_{10} \mathrm{r\_linc\_overall}it + \alpha_i + \epsilon it \end{aligned}$$

4.3. Interactions with the Fixed Effects Model

Finally, we use an interaction model to investigate how relative income vary by gender. First, we interact gender with the overall relative income calculated among everyone. The model is:

$$\begin{aligned}\mathrm{LS}it = \alpha_i + \beta_1 \mathrm{female}it \times \mathrm{a\_linc}it + \beta_2 \mathrm{male}it \times \mathrm{a\_linc}it + \beta_3 \mathrm{female}it \times \mathrm{r\_linc\_overall}it \\ + \beta_4 \mathrm{male}it \times \mathrm{r\_linc\_overall}it + \gamma Zit + State_s + Year_y + \alpha_\mathrm{i} + \epsilon_{it}\end{aligned}$$

Then, we allow for cross comparisons. To this end, we use reference groups among the same gender and the opposite gender. The model is:

$$\begin{aligned}\mathrm{LS}it = \alpha_i + \beta_1 \mathrm{female}it \times \mathrm{a\_linc}it + \beta_2 \mathrm{male}it \times \mathrm{a\_linc}it + \beta_3 \mathrm{female}it \times \mathrm{r\_linc\_female}it \\ + \beta_4 \mathrm{male}it \times \mathrm{r\_linc\_female}it + \beta_5 \mathrm{female}it \times \mathrm{r\_linc\_male}it \\ + \beta_6 \mathrm{male}it \times \mathrm{r\_linc\_male}it + \gamma Zit + State_s + Year_y + \alpha_\mathrm{i} + \epsilon_{it}\end{aligned}$$

In order to analyze how the effect of relative income on SWB varies within different demographic groups, cross-comparisons are inevitable. Within the framework of this analysis, it is important to assess whether the effect of relative income varies between certain reference groups and how the gender difference, which is the main hypothesis of our thesis, modifies this effect. I note that the female dummy is time invariant and drops. However, we can obtain the parameters of the interactions. Thus, this model is constructed to examine the interactions between gender and income variables for specific demographic groups. In the model, γZit represents the other control variables, α_i represents Individual characteristics that do not change over time are removed from the model and controlled by fixed effects, ϵ_i represents error term.

5. RESULTS

5.1. Simple OLS Results

In order to analyze the relationship between income and life satisfaction in the simplest way possible, the study first used the OLS regression model, which we explained in detail in the previous section. Applying this econometric model to 176,543 observations, we find that the independent variables are able to explain about 27% of the variance in the dependent variable, SWB. The results are given in the first column of Table 2. According to this result, age, education, living in the West, number of children, health status and working hours have a significant effect on the SWB level of individuals. With increasing age ($b=0.00497$, $p<0.05$) and educational level ($b=0.0339$, $p<0.001$) happiness increases. Health status is another variable that plays a crucial role in determining SWB levels. It is clear from the results that happiness is positively affected from improvement in health status. With increasing health status from poor health ($b=1.455$, $p>0.001$) to very good health ($b=3.699$, $p>0.001$), SWB also increases accordingly. Marital status was found to have different effects on SWB in different categories. Effect of being single ($b=-0.260$, $p<0.001$), widowed ($b=-0.314$, $p<0.001$), divorced ($b=-0.199$, $p<0.001$) and separated ($b=-0.517$ $p<0.001$) on individuals are negative. Another factor that has a positive effect on SWB is number of child ($b=0.132$, $p<0.001$) and living in West Germany ($b=0.186$, $p<0.001$). While increase in number of children has a positive effect, increase in household numbers has negative effect on SWB (-0.105, $p<0.001$). While this outcome seems contradictory, it might be useful to carry out a more nuanced analysis of the factors contributing to the increase in the number of households. However, this would be the subject of another study.

When analyzing the effects of employment-related variables, we can see that they tend to affect SWB in different ways. The OLS results suggest that absolute income is positively and the relative income is negatively related with life satisfaction, which is one of the main hypotheses of our thesis, are in line with the literature. While absolute income has a positive effect on happiness ($b=0.369$, $p>0.001$), relative income has a much stronger

negative effect on happiness (b=-0.447, p=). From this result we can conclude that one of the main hypotheses of our thesis, which is that individuals' SWB levels are negatively affected as a result of comparing their incomes, i.e. they are unhappy. Other factors that have a negative effect on SWB is being not employed (b=-0.0753, p<0.001) and working hours (b=-4.91e-05), even though b value of working hours is incredibly small, magnitude is still negative.

As a conclusion, while we test the relation between income related variables and SWB of individuals, we observed that not only economic factors but some other social, demographic variables such as age, education, marital status, health status have significant relations SWB. We can conclude that happiness is a function of both economic and social factors.

5.2. Fixed Effect Results

The fixed-effects regression model is also used to analyze the factors that influence individuals' SWB levels, in particular, income and relative income. The fixed-effects model allows us to more accurately analyze the impact of economic and social conditions that change over time on individuals' happiness, as it controls for variables that do not change over time, i.e. remain constant. While constructing the fixed-effects model, we used the same control variables, absolute income and relative income. The results show that the relationship between relative income (b=-0.246, p<0.001) and SWB is negative, which is in line with studies in the literature. The analysis results of the fixed-effect model for each relative income level are summarized in the column 2 of Table 4.

These results show that individuals' income comparisons have a negative effect on their life satisfaction levels. We conclude that when individuals compare their income to other individuals in similar demographic groups, it plays an important role in determining their level of life satisfaction, even if the magnitude is different. In all models, absolute income has a positive and significant effect on life satisfaction. As absolute income increases,

individuals' general well-being levels increase.

5.3. Gender effect in Relative Income: Interaction Results

We now investigate the main research question of the thesis. The results are in the last two columns of Table 2. The gender variable is given in the regression but had to be excluded from the model since the fixed-effects cannot estimate its parameters. The interaction model can then identify how relative income on SWB vary by gender. First, we estimate how overall absolute and relative income vary by gender. The results in column 3 suggest that the absolute income effect on SWB is slightly higher for female (b=0.134) than that of male (b=0.989). However the differences are not statistically significant.

When we analyze the relative income, differences stand out. The relative income effect by gender are highly different. It is -0.183 for males and -0.296 for females. When overall relative income increases for both females and males, females are adversely affected from this change compared to males. However, the differences are statistically significant (p-value=0.0564).

In the final column of Table 4, we investigate cross comparisons. In this model, we compare the relative income of females with respect to the relative income among comparable females and males, and males with respect to the relative income among comparable females and males. The relative income of females with respect to other females is -0.261 while their relative income with respect to other males is -0.177. It means that females are affected more when they compare with other females than males compare their income with females. The differences are found to be statistically insignificant (p-value=0.258).

One interesting result is that the males are not statistically significantly affected when they compare their income with the other males while females are negatively and marginally significantly affected when they compare with the other males. The differences are again not

statistically significant (p-value=0.941). Finally, we test whether there is a statistically significant difference in the estimated parameters when males compare their income with females or males. The differences are not statistically significant (p-value=0.359). However, there is a statistically significant difference in the estimated parameters when females compare their income with females compared to the males (p-value=0.068). This result implies that females are the driving force underlying overall relative concerns and their well-being are affected more when they compare with other females.

Detailed results for all models are given in the appendix section.

Table 4. Detailed Results

VARIABLES	(1) OLS	(2) Fixed Effects 1	(3) Fixed Effects 2	(4) Fixed Effects 3
Female	0.0532***			
	(0.00757)			
Age	0.00497***			
	(0.000377)			
Single	-0.260***	-0.0723**	-0.0729**	-0.0754**
	(0.0116)	(0.0293)	(0.0293)	(0.0294)
Divorced	-0.199***	-0.418***	-0.413***	-0.415***
	(0.0214)	(0.0832)	(0.0832)	(0.0832)
Widowed	-0.314***	-0.0487	-0.0471	-0.0459
	(0.0133)	(0.0403)	(0.0403)	(0.0403)
Separated	-0.517***	-0.364***	-0.363***	-0.362***
	(0.0263)	(0.0481)	(0.0482)	(0.0481)
Education	0.0339***	-0.0259***	-0.0259***	-0.0249***
	(0.00177)	(0.00877)	(0.00878)	(0.00879)
West Germany	0.186***	0.141	0.141	0.147
	(0.0371)	(0.121)	(0.121)	(0.121)
Household size	-0.105***	-0.0366***	-0.0363***	-0.0358***
	(0.00583)	(0.0101)	(0.0101)	(0.0101)
Number of children	0.132***	0.0593***	0.0595***	0.0600***
	(0.00634)	(0.0114)	(0.0114)	(0.0114)
Poor health	1.455***	0.981***	0.981***	0.982***
	(0.0338)	(0.0364)	(0.0364)	(0.0364)
Moderate health	2.323***	1.546***	1.546***	1.547***
	(0.0323)	(0.0379)	(0.0379)	(0.0379)
Good health	3.071***	1.913***	1.912***	1.913***
	(0.0322)	(0.0387)	(0.0387)	(0.0387)
Very good health	3.699***	2.178***	2.178***	2.178***
	(0.0336)	(0.0408)	(0.0408)	(0.0408)
Not employed	-0.0753***	-0.0129	-0.0124	-0.0119
	(0.0119)	(0.0154)	(0.0154)	(0.0154)
Working hours	-4.91e-05	0.00204***	0.00206***	0.00210***
	(0.000266)	(0.000379)	(0.000379)	(0.000379)
Absolute income	0.369***	0.118***		
	(0.00930)	(0.0141)		
Relative income	-0.447***	-0.246***		
	(0.0220)	(0.0365)		
Male*absolute income			0.0989***	0.0992***
			(0.0195)	(0.0195)
Female*absolute income			0.134***	0.133***
			(0.0185)	(0.0185)
Male*relative income			-0.183***	
			(0.0487)	
Female*relative income			-0.296***	
			(0.0453)	
Male*relative income (females)				-0.177***
				(0.0549)
Female*relative income (females)				-0.261***
				(0.0542)
Male*relative income (males)				-0.0851
				(0.0589)
Female*relative income (males)				-0.0907*
				(0.0522)
Constant	5.134***	7.290***	7.267***	7.935***
	(0.221)	(0.438)	(0.438)	(0.484)
Observations	176,543	176,547	176,543	176,435
R-squared	0.270	0.074	0.074	0.074
Number of persons		36,245	36,241	36,236

6. CONCLUSION

Relative concerns have a significant impact on individuals' well-being. For individuals, one of the most important factors influencing their own well-being is the income level of the people around them. This study provides gender-based analysis of how females and males evaluate their own well-being according to the income level of their neighbors and its impact on their happiness.

We use SOEP, which is a long panel data, to investigate the question. We used the life satisfaction approach with OLS and fixed-effects model. In the model, we estimate control variables that have significant effect of individuals' SWB, such as age, health status, residential area, education, and also absolute and relative income. First, we generate relative income for all people then generate the relative income among males and females. To obtain relative income, we created reference group that is similar to Ferrer-i-Carbonell (2005). The result suggests that there is a positive association between absolute income and life satisfaction. This result is not surprising as more income means more well-being. This finding is in line with literature that is also covered in previous chapters. Then, we estimate the relative income for males and females. Both males and females are negatively affected by the overall relative income. However, the effect for females is larger than males. It means that females are driving the overall relative income effect. We then investigate the cross comparisons. From cross comparisons, we found two important findings.

(i) Females compare more with females compared to males compare with other males.
(ii) Females are affected both from the comparison with females and males.

The result in this study has important implications for understanding gender-specific behavior. The females are more under risk of reduction in life satisfaction. This might be related to their gender specific roles, and they might feel stuck in their carrier development in competition to males. For women to internalize the impact of relative income concerns,

they need to be more present and represented in the economy. In this sense, increasing labor force participation is crucial not only for economic development but also for improving social welfare. Increasing women's participation in the labor force contributes to expanding individual freedoms, ensuring gender equality and changing the balance of power within the family (Blau & Kahn, 2017; Goldin, 2014). In this way, the condition of 'being happy at home and at work', which has become more difficult for women with women's participation in the labor force, becomes easier for women to achieve, which has a welfare-enhancing effect on social welfare. Also, attitudes towards income inequality significantly affect individuals' subjective well-being. Understanding the effects of income inequality on females' SWB plays a critical role in social policy making (Clark & D'Ambrosio, 2014)

The thesis has also important limitations. We only focus whether there is a difference in the relative income effect, but we could not go into the channels explaining this result. The future research should focus on identify the gender identity, labor market effects, gender wage gap on this result. Another limitation is that we could not investigate the causal relationship. The future research should also focus on specific experiments – conducted in firms among males and females for instance – to identify the causal effects.

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APPENDIX

A comprehensive explanation of TABLE 4 with the results can be made as follows.

In this study, three basic econometric models—namely OLS, fixed effects, and interaction models—were utilized to examine the relationship between relative and absolute income with subjective well-being (SWB). Additionally, the relationship was examined from a gender perspective to explore how demographic characteristics and economic status affect individuals' SWB levels. The detailed results of these models are summarized in Table 4.

OLS Model

The results of the OLS model are presented in the first column of Table 4. According to the OLS model, there is a positive relationship between being a woman and SWB (0.0532). While this indicates that women tend to report higher levels of SWB compared to men, the model does not account for fixed individual characteristics, which may affect the accuracy of this result. The positive relationship between SWB and age is consistent with previous findings; however, as the model does not account for individual fixed characteristics, this may limit the precision of the estimates.

Marital status emerges as a significant factor, where being single, divorced, or widowed negatively affects SWB levels. Specifically, being single is associated with a reduction in SWB of -0.260, being divorced by -0.199, and being widowed by -0.314. Education also has a positive relationship with SWB (0.339), with higher education levels corresponding to increased SWB. Living in West Germany is another factor positively associated with SWB (0.186), indicating a regional difference in well-being outcomes. Health status is another important factor, with improvements in health leading to increased SWB; poor health is associated with a lower SWB by 1.455, moderate health by 2.323, and good health by 3.071. The analysis shows that as health improves, so does SWB. On the other hand, labor-related variables such as employment status (-0.0753) and working hours (-

4.91e-05) show a negative relationship with SWB.

Regarding income, our results align with the literature. Absolute income shows a positive relationship with SWB (0.369), while relative income has a negative relationship (-0.447). These results suggest that individuals' SWB increases with absolute income but declines when income is compared to others.

Fixed Effects Model

The fixed effects model accounts for individual characteristics that remain constant over time, allowing a more accurate estimation of the effects of time-varying factors on SWB. By controlling for such fixed individual traits, including gender and age, the model isolates the effects of variables that change over time. The results of the fixed effects model are presented in the second column of Table 4 as Fixed Effects 1.

According to the fixed effects model, marital status is negatively related to SWB. Specifically, being single reduces SWB by -0.0723, being divorced by -0.418, being widowed by -0.0487, and being separated by -0.364. Education also shows a negative effect on SWB at -0.0259, differing from the OLS model results. Living in West Germany continues to show a positive relationship with SWB (0.141). Health status remains a critical determinant of SWB, with poor health affecting SWB by 0.981, moderate health by 1.546, good health by 1.913, and very good health by 2.178. As health improves, so does SWB.

In terms of income, the fixed effects model shows consistent results with the literature. While the relationship between absolute income and SWB is positive (0.118), the relationship between relative income and SWB remains negative (-0.246).

Interactions with Fixed Effects

Interaction models, in addition to fixed effects models, allow the analysis of the interaction between gender and income. The main purpose of this model is to assess how

absolute and relative income effects vary by gender and to evaluate the relationship between relative income comparisons and SWB within and between gender groups. The results are presented in Table 4, specifically in the third and fourth columns as Fixed Effects 2 and Fixed Effects 3.

Interactions Model 1 (Fixed Effects 2)

This model focuses on the interaction between gender, relative income, and absolute income. The results of this model are shown in Table 4, third column.

According to the results, absolute income has a positive relationship with SWB for both genders. For men, SWB increases by 0.0989, while for women, it increases by 0.134, indicating that the effect of absolute income on SWB is stronger for women. In contrast, relative income has a negative effect on SWB for both genders. Men's SWB decreases by -0.183 with an increase in relative income, while women's SWB decreases by -0.296, suggesting that women are more sensitive to relative income changes than men.

Interactions Model 2 (Fixed Effects 3)

This model explores cross-gender comparisons, examining how the income of individuals in one gender group influences the SWB of individuals in the opposite gender group. The results of this model are presented in the fourth column of Table 4.

According to the findings, men's income increases negatively affect women's SWB by -0.177. Women's SWB is also negatively affected by the relative increase in income within their gender group by -0.2691. This implies that women are more affected by income increases within their gender group than by income changes in men's groups. When women compare their income to that of their own gender group, they report lower SWB than when they compare their income to men's.

Men's SWB is affected by women's income increases as well, albeit to a lesser extent. The effect of women's income on men's SWB is -0.0907, while the impact within men's own group is -0.0851. Overall, men are more affected by women's income increases than by changes within their own group, though the effect is not as pronounced as it is for women.