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Inflation, Unemployment, and Happiness: Misery Index Weights in Europe

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Abstract

This paper uses micro- and macrolevel data to examine the effects of unemployment and inflation on subjective happiness in Europe. Using data on subjective happiness from the most recent survey waves of the European Social Survey (2004-2018), we find negative coefficients for both unemployment and inflation. However, the marginal effect of unemployment is larger and more robust than that of inflation. In a post-2008 subsample we find that inflation becomes insignificant. Generally, using macrolevel control variables, we find that the significance of inflation weakens or goes away in some cases, whereas the sign and significance of unemployment are largely unchanged, although unemployment becomes insignificant in a subsample of high-income households. On the other hand, we find that the magnitude of the unemployment coefficient increases and becomes statistically more significant for a subsample of the poorest income deciles. Our results indicate that low-income households have a stronger preference for lower unemployment than high-income households. We also try to address possible endogeneity issues by using a weak instrument for inflation, namely landmass.

Keywords: happiness economics, inflation, unemployment, misery index

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1. Introduction

Unemployment and inflation are often the centerpieces of macroeconomic discussions, owing mainly to their effect on the welfare of ordinary citizens and the state of the economy overall. For example, unanticipated changes in consumer prices can affect people directly if wages do not keep up with inflation and becoming unemployed can mean a substantial loss of income for laid off workers. It is therefore reasonable that people are concerned about movements in both figures. Furthermore, as metrics of economic performance, changes in unemployment and inflation are used by voters in democracies to assess the ruling administration (Lewis-Beck & Stegmaier, 2013), but because there can exist a trade-off between fighting unemployment and controlling inflation, the question then arises: which figure is associated with the greatest amount of disutility? One famous example from economics of trying to summarize both figures into one indicator is Okun's misery index, which is calculated by adding the rate of unemployment to the rate of inflation. Disregarding the fact that both variables are not restricted to the same scale, which is why a nation with hyperinflation (e.g., Venezuela in recent years) will always be the most miserable, it may seem reasonable to add these two figures together as both are associated with negative emotions such as stress and low self-esteem. However, trying to reduce the dimensionality in this simple manner comes with a downside. By adding both figures together the index assumes that unemployment and inflation are equally important in determining economic misery, i.e., it assumes that the distress caused by the lack of jobs is the same as the distress caused by the rising cost of living, and ultimately this assumption might not accurately reflect the actual relative effect of changes in inflation and unemployment on the well-being of the citizenry. Furthermore, if we consider the complexities of social preferences, it is only natural to speculate that these relative effects can change over time, depending on the state of the economy at a particular time. Therefore, the main aim of this paper is to study the relationship between subjective happiness of citizens and changes in inflation and unemployment for a time period largely not covered by the existing literature.

In an early study of the relative effects of inflation and unemployment, Easterly & Fischer (2001) found that inflation was the most pressing issue of the day (May 1995) and specifically that people from poorer households were significantly more likely to mention inflation as a top national concern. Correspondingly, high levels of inflation have been shown to act as a regressive tax (Boel, 2018). However, in recent decades, the United States and large parts of Europe have experienced a prolonged period of stable prices, which makes inflation less salient, especially for the younger generation that did not experience prolonged periods of

high inflation in the past. Welfare costs have also been shown to increase greatly with higher levels of inflation (Serletis & Xu, 2021) and inflation has also been shown to be borne mostly by the poor and old (Cao, Meh, Ríos-Rull & Terajima, 2021). Traditionally, because poor people more often hold their wealth in liquid assets, inflation has often been viewed by economists as a tax on the poor. Likewise, for reasons such as financial and job security, one can reasonably expect to find heterogeneous effects of unemployment across the income distribution as highly educated and wealthy individuals have greater levels of job security and more wealth to fall back on. Therefore, in addition to studying the relationship between happiness and unemployment and inflation, we will also look for heterogeneous effects using subsamples of high- and low-income individuals respectively.

Currently, the relevance of uncovering a country's utility of lower unemployment versus lower inflation is revitalized following the Corona pandemic where several countries experienced sharp increases in unemployment (Su, Dai, Ullah & Andlib, 2021) followed by a drastic rise in inflation (Long, Chang, Jegajeevan, Kai, 2021), having been preceded by decades of low inflation as mentioned earlier. As central banks frequently need to slow down economic activity to control inflation, the question arises if citizens as a whole prefer higher employment over lower inflation. Specifically, this becomes relevant whenever a government or central bank is faced with a trade-off between fighting unemployment and controlling inflation. Based on consumer behavior, for example, people tend to be only willing to give up only a fraction of 1% of their income to avoid 10% inflation (Boel & Camera, 2011). In Europe in particular, the stated policy goal of the European Central Bank is to maintain stable prices and it makes no reference to economic activity (Debortoli, Kim, Lindé & Nunes, 2019), e.g., output or unemployment. If central banks act to maximize the welfare of the citizenry, this policy goal is at odds with, for example, two early studies of the relative importance of unemployment versus inflation in determining well-being, namely Di Tella, MacCulloch, & Oswald (2001, 2003) and Wolfers (2003), that concluded that higher levels of unemployment are associated with lower levels of well-being than inflation.

As most studies on this topic are decades old at this point, this paper seeks to readdress this issue of the relative importance of unemployment and inflation in Europe using the newest, most up-to-date data from 2004 to 2018. Diverging from topic-specific survey questionnaires about pressing economic issues, we seek to adopt a happiness economics-inspired approach to this research question to find out which variable is associated with the lowest level of happiness. Using combined data from the European Social Survey, World Development Indicators from the World Bank, Worldwide Governance Indicators from the World Bank, and data on the

national net replacement rates in unemployment from OECD Statistics, we examine the effect of these macrolevel variables on microlevel subjective well-being. As unemployment and inflation ultimately can be affected by governments and we are dealing with observational data, we carefully try to handle the issue of endogeneity. Firstly, we do so by introducing extra control variables that so far have not been used by the existing literature and, unlike previous studies, we also report our results using an instrumental variable approach to estimating the effect of inflation on happiness. Formally, inspired by Romer (1993), we do so by using landmass as an instrument for inflation. Ultimately, our hope is that this study may help better guide economic policy decisions by providing evidence of a welfare cost of inflation and unemployment as well as their relative effects, measured as the coefficient ratio, on well-being.

The rest of this paper consists of eight sections. Section 2 briefly summarizes recent developments in the happiness economics literature and specifically papers related to our research question. Section 3 presents theoretical considerations underlying our hypothesis and formally describes the purpose of our analysis. Section 4 describes the data, including its main statistical characteristics, examines the time series of average national happiness, and presents correlations between happiness, inflation, and unemployment. Section 5 presents the methodology used in this study, including arguments for our statistical approaches and regression setups. Finally, Sections 6-7 presents our results and corresponding robustness checks, and Sections 8-9 discuss and conclude our findings concerning the misery index weights and give suggestions for future research.

2. Literature Review

The idea of using subjective well-being survey data to answer economic research questions dates to at least Easterlin (1974) whose original paper is generally recognized to have started the field of happiness economics. The question of whether income and economic growth positively affect self-reported happiness has been studied extensively since. Generally, income has a relative (comparative) and absolute (in terms of living standards) effect on subjective happiness (Clark, Frijters, & Shields, 2008), but the effect of economic growth on happiness is inconclusive (Easterlin, 2013; Veenhoven & Vergunst, 2014).

Within the happiness economics literature, as noted by Easterlin (2003), the terms happiness, utility, well-being, life satisfaction and welfare are used interchangeably to describe how content people are with their lives in general. To avoid any confusion, in this paper we will primarily use the term happiness. In any case, what is meant by all these terms is subjective well-being reported in social surveys. As we are more interested in the subfield of happiness

economics that deals with inflation and unemployment, we shall review some of the most relevant papers below. At last, it is worth noting that in the literature there is a tendency to report the relative coefficient magnitude of unemployment and inflation, although these variables are not necessarily restricted to the same scale. The general point is to compare how a one percentage point change in inflation and unemployment respectively affect the subjective well-being variable. The relative magnitudes are calculated as the ratio of the estimated coefficients.

In an early study of the effects of inflation and unemployment on life satisfaction, using data from several European countries (1975-1992) and the United States (1972-1994), Di Tella, MacCulloch, & Oswald (2003) found that unemployment had a marginal effect on subjective well-being that was approximately twice as large as inflation, even after controlling for unemployment benefits, and that this result is robust to various control strategies. This finding, i.e., that unemployment is associated with larger life dissatisfaction, has been reaffirmed by several follow-up studies, including Ruprah & Luengas (2011) in a study of Latin American countries (1997-2006) who found that the relative coefficient magnitude of the misery index variables was one to eight, such that unemployment was associated with an eight times larger decrease in well-being than inflation, while controlling for fixed year effects and country fixed effects and personal characteristics such as wealth. Similarly, in a study of 25 countries, including EU countries, Eastern European countries, United States, and Mexico (1973-2006), Blanchflower (2007) found a relative coefficient magnitude equal to approximately 1.62, whereas Wolfers (2003) in a study of European countries and the United States (1972-2000) found a relative coefficient magnitude of 4.7. It should be noted that the time periods studied and the countries sampled do not overlap, further indicating that the relative effects of unemployment versus inflation may vary depending on the economic context in the sample. In general, however, it appears that the weights, as measured by the relative coefficient magnitude, are not one-to-one as implicitly assumed by the misery index, and most studies indicate that unemployment is associated with lower unhappiness than inflation. In a newer study using updated data, Hofstetter & Rosas (2021) found relative weights for Latin American (1997-2013) equal to 4.5-4.8, whereas they found relative weights in Europe equal to 1.3-1.8 (1975-2002), further indicating that the effects of these variables vary between geographic regions and change over time. In general, all previous studies have found that the well-being of citizens is more negatively affected by a one percentage point increase in unemployment than a one percentage point increase in inflation. It is important to note that none of these studies use experimental data. Instead, they use control and lag strategies to attempt to prove causality.

Alternatively, using public opinion polls, Fischer & Huizinga (1982) found that citizens generally viewed inflation as a more pressing economic issue, but at the same time were unwilling to have lower inflation at the cost of higher unemployment. Furthermore, they also found that unemployment became a more pressing issue for respondents only during a recession. Therefore, there is a discrepancy between results using topic-specific questionnaires versus using the national unemployment and inflation rates to predict changes in subjective well-being data. Ultimately, none the of the papers surveyed above use an experimental approach and therefore issues of endogeneity may be relevant as noted by Di Tella et al. (2003). Although various control strategies have been used in the literature, it is difficult to say if these capture the causal effects of unemployment and inflation on happiness.

3. Problem Formulation

There exists an extensive literature showing the welfare cost associated with inflation and unemployment, for example Miller, Martins & Gupta (2019) who indicate that 10% inflation leads to a welfare cost equivalent to approximately 0.3% of GDP in the United States, and Rojas (2019) who shows that unemployment has large non-pecuniary effects on well-being. Furthermore, monetary compensation is not enough to restore the amount of lost welfare (Suppa, 2021). Based on this literature and theoretical frameworks, we postulate the existence of a welfare function $W(\pi_t, u_t, X_{it}, M_{it})$, where π_t and u_t are the national rates of inflation and unemployment respectively, X_{it} is a vector of personal characteristics, including personal employment status and income, for individual i at time t, and M_{it} is a vector of macroeconomic variables such as GDP growth. Furthermore, we postulate that $\frac{\partial W(\pi_t,u_t,X_{it},W_{it})}{\partial \pi_t} < 0$ and $\frac{\partial W(\pi_t,u_t,X_{it},M_{it})}{\partial u_t} < 0$ (Hypothesis 1) and, specifically, we postulate that $\left|\frac{\partial W(\pi_t,u_t,X_{it},M_{it})}{\partial u_t}\right| > \left|\frac{\partial W(\pi_t,u_t,X_{it},M_{it})}{\partial \pi_t}\right|$ for Europe in the time period 2004-2018 (Hypothesis 1A). Including additional controls such as personal employment status and income is a means of capturing the direct effect of the misery index variables versus capturing additional effects such as individual i becoming unemployed themselves. Including additional macroeconomic variables such as GDP growth is a means of controlling for, e.g., business cycle effects. We will expound on this further in Sections 4 and 5.

Specifically, Hypothesis 1 relates to the question of whether welfare is affected by inflation and/or unemployment and Hypothesis 1A relates to the question of whether the relative weights in the misery index are equal or not. As evidenced by previous studies, it

appears that the effect of unemployment is larger, although it is not certain if this applies to the post-2002 time period for Europe, which so far has largely not been examined by the literature. As a baseline, we will study all income groups in a pooled regression, but inspired by the Rawlsian utility function, where the welfare of the worst-off individuals is the object to be maximized, and reasoning concerning varying levels of job security and effects of inflation on labor contracts, we will look for heterogenous effects across the income distribution. In particular, we will examine subsamples of high- and low-income groups as job security, wealth, and financial stress are varied across occupations and class. Ultimately, if we can show that $\left|\frac{\partial W(\pi_t,u_t,X_{it},M_{it})}{\partial u_t}\right| > \left|\frac{\partial W(\pi_t,u_t,X_{it},M_{it})}{\partial \pi_t}\right|$, i.e., the absolute marginal effect of unemployment on happiness is larger than that of inflation for Europe during 2004-2018, then we can collaborate earlier findings and add more insight into the optimal trade-off between inflation and unemployment; if we are not able to show this, we can shed more light on the varying nature of the effects of unemployment and inflation on well-being. In comparison to previous related studies, we seek to use more updated data that includes previously untested countries and time period (post-Great Recession), and we will also attempt to adopt an instrumental variable approach to check for the robustness of our findings.

4. Data and Descriptive Statistics

The data used in this paper is combined from four different sources. The microeconometric data comes from the European Social Survey (ESS), whereas the macroeconometric data comes from the World Bank's World Development Indicators (WDI), the World Bank's Worldwide Governance Indicators (WWGI) and OECD Statistics.

4.1. Microeconometric Data

The ESS is a representative biannual survey conducted in various European countries and countries bordering Europe (Israel and Turkey) from 2004 to 2018. Specifically, the countries that are included in our sample are Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Luxembourg, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom. The composition of countries changes each wave because some countries are not sampled certain waves. The ESS is conducted as a physical interview of randomly sampled individuals aged 15 or older where the interviewee is asked questions regarding happiness, household income rank, education, et cetera. Although the ESS is similar in interview design and questions to the Eurobarometer and

Latinobarómetro, two examples of frequently used social surveys in the happiness economics literature, the time period of the data used in this paper does not overlap with, for example, Di Tella et al. (2003) and Hofstetter & Rosas (2021). Furthermore, the survey waves 1-3 of the ESS contain a distinct household income variable than survey waves 4-9, leading to data compatibility issues that we will address below.

4.2. Macroeconometric Data

The WDI is a databank of the World Bank that compiles international statistics regarding inflation, unemployment, GDP per capita, and GDP growth from local sources, for example national statistics offices. Our WDI and WWGI data is selected to overlap with the ESS survey waves, as such we use WDI data running from 2004 to 2018. OECD Statistics is the statistical database of the OECD countries and, in a few cases, non-OECD countries. For our purposes, OECD Statistics contain data for the national net replacement rates in unemployment (2004-2018). Overall, the datasets have been merged in Stata using a time index and country identification number. The World Bank and OECD data contains no missing observations, whereas uninterpretable or missing observations, such as "I don't know" or "not applicable", have been dropped from the ESS.

4.3. Variable Description

Our dependent variable in this case comes from the variable 'happy' in the ESS. Specifically, the question asks (using various translations) 'All things taken together, how happy would you say you are?' on a 0-10 scale with 0 meaning 'extremely unhappy' and 10 meaning 'extremely happy.' A major conceptual issue of this variable that might be especially relevant in our multinational study is the cross-cultural reliability of using subjective happiness to measure well-being. However, subjective happiness has been shown to be a valid measurement of happiness in different countries (Mattei & Schaefer, 2004; Spagnoli, Caetano & Silva, 2012). Furthermore, studies have shown that this subjective happiness scale in different languages remains a consistent and internally valid measurement of well-being (Dogan & Totan, 2013; Quezada, Landero & González, 2016). Based on these findings, we assume that translations of the happiness question translate well into other languages. For the purposes of testing our hypotheses, we further assume that happiness is a meaningful proxy for utility in the social welfare function. Although the dependent variable is discrete and has a limited scale, using formally more appropriate models such as Ordered Logit or Ordered Probit leads to results that are comparable to OLS (see for example Arge, 2021).

Turning to our main regressors, our variables measuring inflation and unemployment come from the World Development Indicators dataset by the World Bank. Specifically, inflation is recorded in terms of changes in the consumer price index, i.e., the annual percentage change in the CPI. Formally, the Laspeyres formula is used in calculating the rate of inflation. Similarly, unemployment is recorded as the proportion of the labor force that is without work but looking for employment.

Furthermore, additional macroeconomic regressors include GDP per capita in constant 2015 USD, GDP growth, and the net replacement rate in unemployment (replacement rate). All these variables come from our World Bank WDI dataset, except data for the replacement rate which comes from OECD Statistics. The replacement rate is the proportion of previously earned income that a person receives from the government after becoming unemployed. Furthermore, our dataset contains macrolevel income (GDP per capita) and personal household income (decile income rank). As evidenced by the happiness economics literature, the relationship between income and happiness is complicated. Specifically, it appears that the effect of income is relative first and foremost and secondarily absolute (Ball & Chernova, 2008). The household income decile rank is supposed to capture this relative effect, whereas the absolute level of GDP per capita is supposed to capture the general living standards of the country. Ultimately, as we are dealing with survey questionnaires, it is possible that the household income rank contains measurement error.

4.4. Summary Statistics

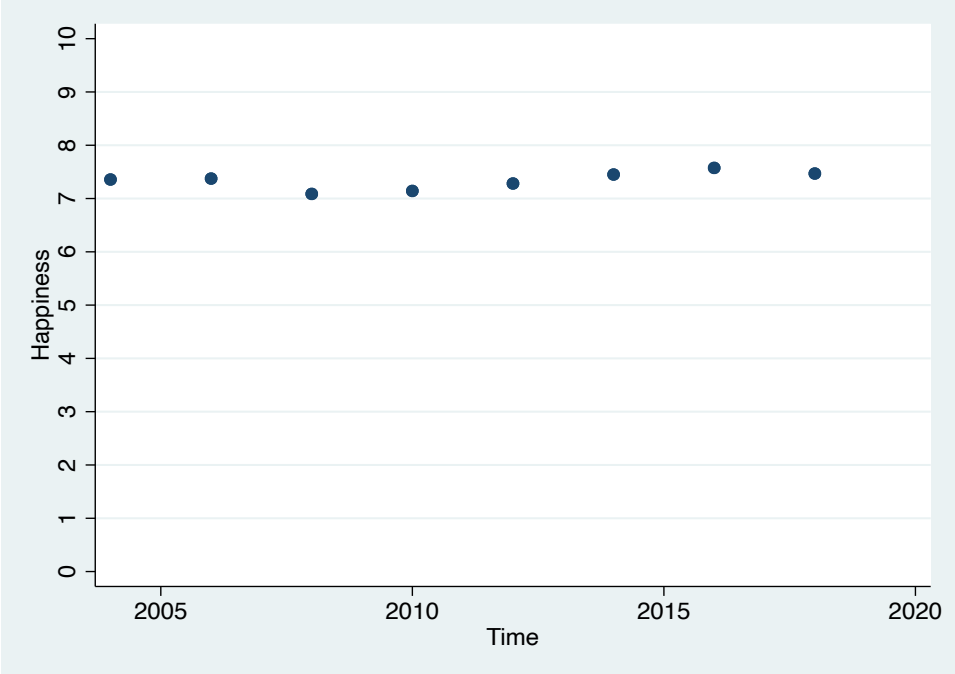

Figure 1: Pooled average happiness 2004-2018

Starting with our primary variables of interest, namely happiness, inflation, and unemployment, as evidenced by Figure 1, we see that average happiness in the dataset tends to be very stable over time with no noticeable time trend. Generally, average happiness appears to move in a tunnel bounded by 7 and 8 happiness out of 10. Furthermore, looking at the distribution of individual-level happiness in Figure 2, we see that individual-level happiness is quite negatively skewed with a mode of 8, and overall, relatively few individuals report happiness lower than 5/10. This above-midpoint reported happiness is not country specific as no country has a lower average reported happiness of less than 5 in the sample. As we are dealing with subjective survey data, it appears that regardless of culture, people tend to report a positive perception of life. The highest average happiness was reported in Iceland in 2004 at 8.47, whereas the lowest reported average happiness was reported in Bulgaria in 2008 at 5.22. The distributions of individual countries are all very similar and as such the shape of the distribution does not seem to be culture-specific but may rather be a result of social norms or personal bias.

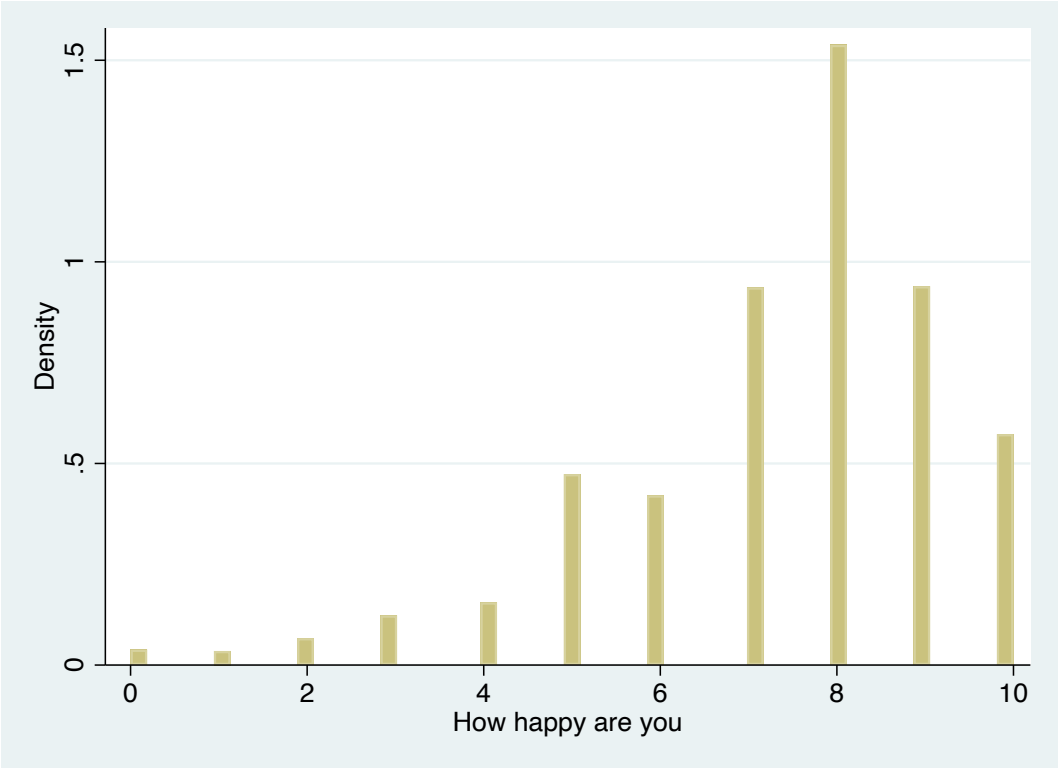

Figure 2: Histogram of individual happiness

Furthermore, plotting happiness against inflation in Figure 3, we find what appears to be a negative slope such that the correlation between inflation and average national happiness is negative. As indicated by the graph, most of our observations are concentrated between 0-5% inflation with few outliers. Likewise, plotting happiness against unemployment in Figure 4, we likewise find a negative slope, such that the correlation between average national

happiness and the national rate of unemployment is negative. The lowest level of inflation was -0.92 recorded in Ireland in 2008, whereas the highest level of inflation was 15.40 recorded in Latvia in 2008. Overall, we find an average rate of CPI inflation of 2.25, which corresponds well to the long-run target of the ECB which covers a large chunk of the sample. The lowest unemployment rate was 2.24 recorded in Czechia in 2018, whereas the highest unemployment rate as 24.79 recorded in Spain in 2008. The main statistics of these variables are summarized in Table 1 below.

Table 1: Descriptive Statistics of Main Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
happy	177	7.373	.652	5.22	8.466
inflationcpi	177	2.254	2.171	-.922	15.402
unemployment	177	7.762	3.838	2.24	24.79

Notably, in comparison to a related studied of Europe (1975-2002) by Rosas & Hofstetter (2021), we have a similar mean (7.8% vs. 7.6%) and variance of unemployment (3.8% vs. 3.8%) but a lower mean (2.3% vs. 5.7%) and a smaller variance of inflation (2.2% vs. 5.2%). Therefore, it is worth noting that our sample contains much lower and more stable levels of inflation than related studies, but similar variance and mean of unemployment.

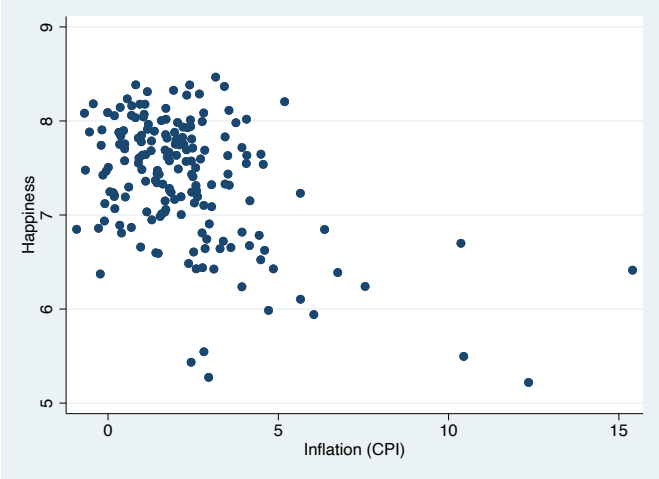

Figure 3: Inflation (CPI) and happiness

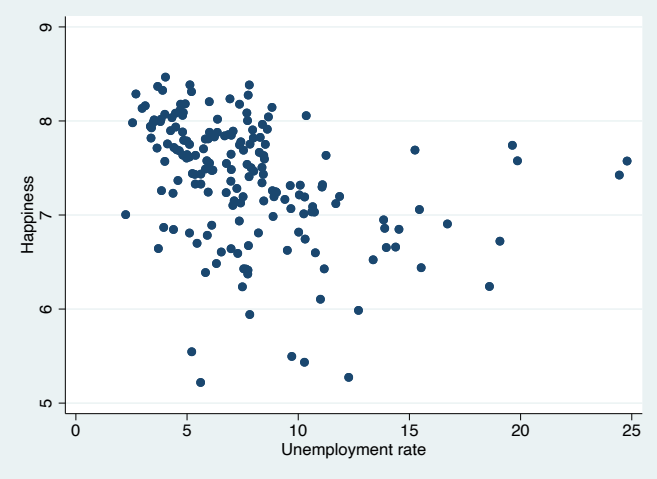

Figure 4: Unemployment rate and happiness

Moreover, plotting happiness against GDP per capita in constant 2015 USD in Figure 5, we see that richer countries tend to report higher average national happiness. However, roughly speaking, the curve appears to flatten at approximately 60,000 USD. This curve is in line with Easterlin & Angelescu (2009). Furthermore, theoretically, this is in line with a marginally diminishing utility of income which serves as a proxy for consumption to some extent. The summary characteristics of GDP per capita, GDP growth, the replacement rate, and

landmass are reported in Table 2 below. Notably, we observe large variation in GDP per capita. The largest GDP per capita in constant 2015 USD was observed in Luxembourg in 2004 at approximately 100,252, whereas and the lowest GDP per capita in constant 2015 USD was observed in Bulgaria in 2010 at 6,427. GDP per capita is controlled for in some specifications as it is likely correlated with overall economic development. Although we have a sample of mostly European countries, we nonetheless observe large differences within Europe in terms of general economic development.

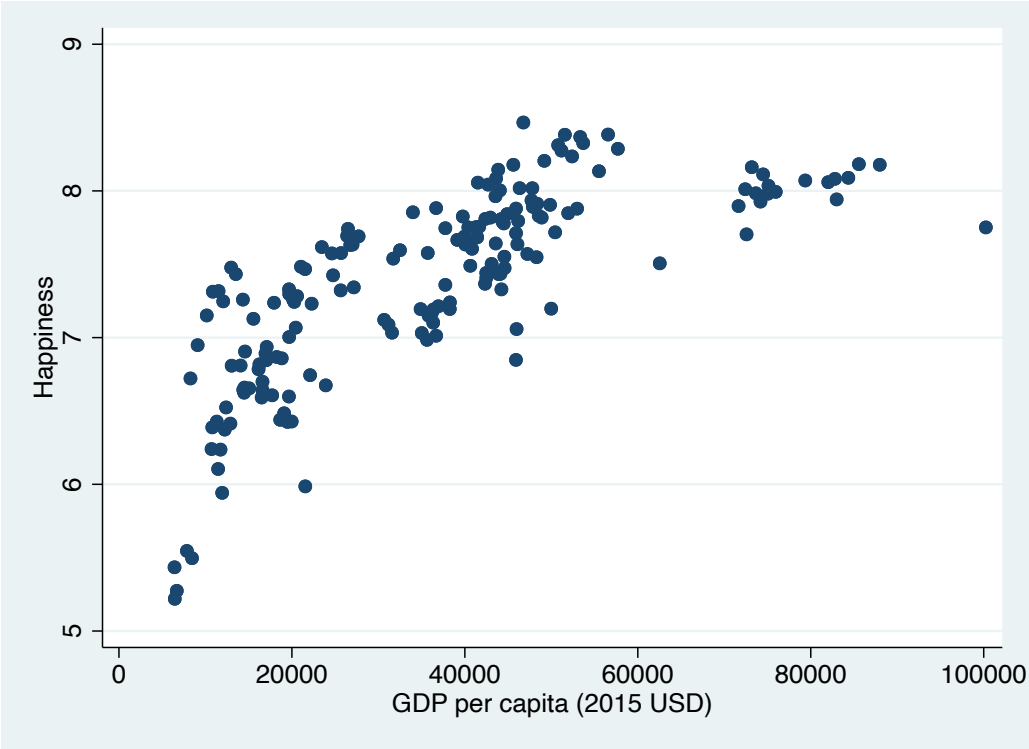

Figure 5: GDP per capita (constant 2015 USD) and happiness

Table 2: Descriptive Statistics of Macroeconometric Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
gdpcapita	177	36369.414	20123.246	6427.81	100252.24
gdpgrowth	177	2.392	2.393	-5.479	9.766
replacementrate	177	70.254	10.122	41	98
landmass	177	181772.93	171954.76	2430	769630

At last, turning to our microeconometric variables, we see that those who have recently been unemployed report lower levels of happiness. A t-test for equal sample means shows that this difference is significant at -0.59 on average. As personal unemployment is associated with lower income, financial problems, and social problems, this is what one would expect to find, and this result is also in line with Di Tella et al. (2003). We will control for individual employment status in our microeconometric regressions so that we can isolate the effect of

nationwide unemployment on happiness. Additionally, we find evidence for a difference in average happiness between males and females in Europe 2004-2018. Specifically, the mean difference is 0.02, such that men report higher levels of happiness, and this difference has a t-value of 2.34. However, our whole sample also contains 84275 (52%) female observations and 77048 (48%) male observations, meaning that women are slightly overrepresented. Therefore, we will also control for gender in our microeconometric regressions. As evidenced by Frijters & Beatton (2012), the relationship between age and happiness appears to be convex with a minimum at 35-50 in different surveys, which is why age will be included in a linear and quadratic form. Some of the most important characteristics of the microeconometric variables are summarized in Table 3 below. The oldest person in our original sample is 123, which may be due to measurement error. However, only three persons in our sample reported being older than 110 overall. 3 persons reported being younger than 15 which per ESS guidelines must be a measurement error. All these mismeasured observations have been dropped, although mismeasured age ought not to lead to substantial bias because they are a tiny fraction of the overall sample.

Table 3: Descriptive Statistics of Microeconometric Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
agea	161323	50.112	18.13	15	114
employmentstat	161323	3.179	2.584	1	9
hhincome	161323	5.229	2.777	1	10
educ	161323	4.069	3.288	1	55
marriage	161323	3.095	2.247	1	6

Surprisingly, we find that the item hhincome (household income decile rank) has a mean of 5.2 instead of the theoretically assumed value 5.0. The tabulation of this item is displayed in Figure 4 below. As evidenced by the table, the share of deciles 10, 9 and 8 are underrepresented, whereas the rest are overrepresented. Specifically, the null hypothesis of hhincome (for the whole sample) being uniformly distributed has a p-value of approximately 0 using a chisquared test (see Appendix II for more details), meaning that we do not have a totally representative sample of household incomes.

Table 4: Tabulation of hhincome

Household's total net income, all sources	Freq.	Percent	Cum.
J - 1st decile	16415	10.18	10.17
R - 2nd decile	17891	11.09	21.27
C - 3rd decile	17800	11.03	32.30
M - 4th decile	17837	11.06	43.36
F - 5th decile	17488	10.84	54.20
S - 6th decile	16677	10.34	64.53
K - 7th decile	16471	10.21	74.74
P - 8th decile	15430	9.56	84.31
D - 9th decile	12775	7.92	92.23
H - 10th decile	12539	7.78	100.00
Total	161323	100.00	

It should be noted that these are the summary statistics for the 2010-2018 subsample that we will use for our microeconometric specifications. Because of data incompatibility and missing observations, we lose many observations for this subsample. Summary statistics for the whole sample (2004-2018) are reported in Appendix I.

5. Methodology

Assuming that subjective happiness is a meaningful measurement of well-being, we shall further assume that the social welfare function can meaningfully be estimated using social survey data on happiness. It should be noted that previous studies usually use survey questions about life satisfaction instead of happiness. Specifically, although closely related papers, including Wolfers (2003) and Di Tella et al. (2003), have used questions about life satisfaction, the correlation between the two measurements is very high (Gundelach & Kreiner, 2004). Furthermore, previous studies usually either use a microlevel or a macrolevel specification. In this paper we will use both because, firstly, we do not have microlevel household income for pre-2010 data and, secondly, this also serves as a robustness check for issues relating to clustering of the standard error at the macrolevel. As shown by Cheah (2009), we must be careful when regressing microlevel variables on macrolevel regressors as this may lead to incorrect inference because the standard errors are underestimated. Therefore, in this paper we adopt a similar approach to that of previous studies by using the country-year identifier as the cluster variable whenever we mix macrolevel and microlevel variables.

5.1. Micro Regression

Firstly, we will use the microeconometric data to control for individual observable characteristics. In this case, as our primary microeconometric variable, household income, is only available for survey wave 4-9, we will only be able to estimate the microeconometric specification for the years 2010-2018. Specifically, we estimate an OLS specification that is akin to, for example, Blanchflower, Bell, Montagnoli, & Moro (2014):

$$happiness_{ict} = \pi_0 + \pi_1 inflationcpi_{ct} + \pi_2 unemployment_{ct} + \sum_{i=1}^{29} \rho_i cntry_c^i + \sum_{j=1}^{4} \sigma_j wave_t + \Theta' X_{ict} + u_{ict}$$

where $happiness_{ict}$ is the happiness of individual i in country c at time t. The variables unemployment, inflationcpi, cntry, and wave represent the main macroeconometric variables and the fixed country/year effects. X_{ict} (a vector) represents the microeconometric control variables, and Θ represents the corresponding marginal effects of these variables. Formally, we control for household income decile, educational level, marriage status, personal unemployment status, age in linear and quadratic form, and gender. In addition to this baseline specification, we also include control regressions where we will also control for the level of GDP per capita, GDP growth and replacement rate in a similar fashion to Di Tella et al. (2003):

$$happiness_{ict} = \pi_0 + \pi_1 inflationcpi_{ct} + \pi_2 unemployment_{ct} + \sum_{i=1}^{29} \rho_i cntry_c^i + \sum_{j=1}^{4} \sigma_j wave_t + \Theta' X_{ict} + \omega_1 gdpgrowth_{ct} + \omega_2 gdpcapita_{ct} + \omega_3 replacement_{ct} + v_{ict}$$

Specifically, the GDP growth variable is supposed to control for differences in the business cycle in different countries, and the GDP per capita variable is supposed to control for the overall economic development, i.e., standards of living within a country that the relative income variable does not capture. As these variables are possibly correlated with inflation and unemployment, we will include specifications that add these macroeconomic controls. In this specification, π_1 and π_2 are the primary parameters of interest. We will report the estimated ratio $\frac{\hat{\pi}_2}{\hat{\pi}_1}$ to capture the relative coefficient magnitude.

5.2. Macro Regression

Secondly, we will aggregate the individual happiness data to a national level by calculating the average happiness of each country for each biannual survey wave (2004-2018), i.e., the unconditional happiness means, and combine this data with the World Development Indicators, Worldwide Governance Indicators and OECD replacement rates. Formally, we estimate the following OLS specification:

$$happiness_{ct} = \alpha_0 + \alpha_1 inflationcpi_{ct} + \alpha_2 unemployment_{ct} + \sum_{i=1}^{29} \beta_i cntry_c^i + \sum_{j=1}^{7} \gamma_j wave_t + \epsilon_{ct}$$

where happiness is the average national happiness of country c at time t. Unemployment and inflationcpi refer to the national unemployment and inflation rates, whereas the sum of cntry represents the fixed country effects and the sum of wave represents the fixed year (wave) effects. As in the microeconometric setup, we also include control specifications where we add the macroeconometric control variables. In these specifications, α_1 and α_2 are the primary parameters of interest and we will report the ratio $\frac{\hat{\alpha}_2}{\hat{\alpha}_1}$ to capture the relative coefficient magnitude.

5.3. Endogenous Inflation

A fundamental issue not dealt with in the literature is the issue of endogeneity. One might speculate that variations in inflation are correlated with variation in macroeconomic mismanagement. That is, macroeconomic mismanagement is expected to cause higher levels of inflation. This is because countries with politically dependent central banks have higher levels of inflation (Klomp & Haan, 2010). A problem arises in our case if macroeconomic mismanagement causes lower levels of happiness for citizens. Although we so far have proposed controlling for an array of observable covariates, it is difficult to determine whether such a control strategy approaches a causal estimate. Naturally, as we are dealing with macroeconomic variables, good and reliable instruments are difficult to find. Nonetheless, we try to address this problem somewhat by using the logarithm and level of a country's landmass as an instrument for inflation. Ultimately, this idea is inspired by Romer (1993) who argues that larger countries are less open in terms of trade and hence have higher inflation. As such, differences in landmass lead to variation in inflation due to trade. Overall, the relationship appears to be contextual as studies of different geographic regions have found different results.

For example, Bowdler and Nunziata (2006) in a study of OECD countries found a negative relationship between trade and inflation in accordance with Romer (1993). However, in a study of Middle Eastern and North African countries, Lotfalipour, Montazeri & Sedighi (2013) found a positive relationship between inflation and trade. Nonetheless, it was not possible for this paper to find a reasonable instrument for unemployment. Therefore, we must assume that the national unemployment rate is exogenous after controlling for observables, an assumption that may be scrutinized. High unemployment may also be the result of macroeconomic mismanagement. However, we have to assume that this is not the case. It is reasonable, nonetheless, to assume that landmass does not have a direct effect on happiness. As per standard IV requirements, this specification assumes that the instrument (landmass) is strongly correlated with the endogenous variable (inflation) and that there is no correlation between landmass and the error term, i.e., there is no correlation between a country's landmass and its current macroeconomic policies. For our IV regressions, we treat inflation as determined endogenously by macroeconomic mismanagement and use the log and level of landmass as an instrument to measure the exogenous variation in inflation.

6. Results

Firstly, to make sure our happiness measurement has a meaningful interpretation, we regress the dependent variable, happy, on all our microlevel variables that measure individual/personal characteristics and exclude all the macroeconomic economic variables to see if all the coefficients have sensible signs and significance levels. In this specification, we use the individual respondent's id as the cluster variable as there are no macroeconomic variables involved. Furthermore, the reference income group is the 1st income decile, the reference employment status is paid workers, the reference relationship status is married individuals, the reference education group is people with incomplete lower secondary education, and the reference gender is male.

Table 5: Happiness regression without variables of interest

VARIABLES	(1) happy		
hhincome_decile2	0.306***	marriage_union	-0.185***
	(0.0185)		(0.0443)
hhincome_decile3	0.453***	marriage_separ	-0.659***
	(0.0189)		(0.0426)
hhincome_decile4	0.556***	marriage_divor	-0.494***
	(0.0192)		(0.0153)
hhincome_decile5	0.673***	marriage_wido	-0.651***
	(0.0196)		(0.0176)
hhincome_decile6	0.749***	marriage_single	-0.447***
	(0.0200)		(0.0128)
hhincome_decile7	0.828***	educ_lscndry2	-0.0247
	(0.0204)		(0.0184)
hhincome_decile8	0.884***	educ_uscndry1	0.0886***
	(0.0209)		(0.0194)
hhincome_decile9	0.954***	educ_uscdry2	0.131***
	(0.0221)		(0.0187)
hhincome_decile10	1.098***	educ_advvoc	0.175***
	(0.0225)		(0.0199)
employmentstat_educ	0.150***	educ_ltertiary	0.236***
	(0.0220)		(0.0209)
employmentstat_unemp1	-0.551***	educ_utertiary	0.227***
	(0.0226)		(0.0206)
employmentstat_unemp2	-0.493***	educ_other	0.318***
	(0.0344)		(0.0828)
employmentstat_sick	-0.842***	female	0.130***
	(0.0269)		(0.00886)
employmentstat_retired	-0.0468***	agea	-0.0569***
	(0.0161)		(0.00168)
employmentstat_military	-0.147	ageasq	0.000513***
	(0.121)		(1.65e-05)
employmentstat_housework	-0.00704		
	(0.0181)		
employmentstat_other	-0.0781*		
	(0.0445)		
Country fixed effects	Yes		
Year fixed effects	Yes		
Constant	8.356***		
	(0.0555)		
Observations	161,323		
R-squared	0.192		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In this regression (Table 5) we find results that are in line with the happiness economics literature. The main findings are that happiness is positively correlated with household income rank. As expected, the top income decile reports the highest level of happiness, and the lowest income decile reports the lowest level of happiness. Similarly, we see that married people report the highest levels of happiness, compared to all other relationship statuses. As found in other papers (see for example Clark, 2019), we find a convex relationship between happiness and age, while controlling for a variety of other variables. Differentiating happiness with respect to age we get $\frac{\partial happy_{it}}{\partial age_{it}} = -0.0569 + 2 \cdot 0.000513age$ such that age minimizes happiness at $age^* = \frac{0.0569}{2 \cdot 0.000513} \approx 55.46$. However, this is slightly higher than the 35-50 range reported by Frijters & Beatton (2012), for example. At last, as discussed earlier, we see that unemployed individuals report significantly, statistically and practically, lower levels of happiness, despite controlling for household income. This might either be an endogeneity problem such that people who are unemployed have other characteristics that affect their happiness, for example mental health problems. However, this might also be an indication of a standalone effect of unemployment on psychological well-being such as loss of confidence, guilt and/or stress. Furthermore, we find that men in the survey generally report lower levels of happiness, despite controlling for income and employment status that might vary between the genders. An issue raised by Di Tella et al. (2003) is the issue of reference groups in determining the utility of personal income, but as evidenced by Arge (2021), controlling for peer group income, defined by people of similar age, education, and gender, has no significant effect on the coefficient of a respondent's own personal household income. Overall, these observable variables explain 19.2% of the variation in personal happiness.

6.1. Microlevel happiness regressions

In Table 6 we have a set of four regressions. The first regression contains no macroeconometric control variables, whereas one additional control variable is added incrementally to the subsequent regressions. This procedure of adding a control variable incrementally is a means of checking the sensitivity of the coefficients of our primary variables after controlling for other economic factors.

Table 6: Microlevel happiness regressions

VARIABLES	(1a) happy	(2a) happy	(3a) happy	(4a) happy
inflationcpi	-0.0120	-0.00561	-0.0106	-0.0102
	(0.0180)	(0.0181)	(0.0172)	(0.0170)
unemployment	-0.0354***	-0.0320***	-0.0258***	-0.0258***
	(0.00826)	(0.00758)	(0.00829)	(0.00828)
gdpgrowth		0.0168*	0.0146	0.0144
		(0.00969)	(0.00907)	(0.00909)
gdpcapita			1.05e-05**	1.04e-05**
			(4.21e-06)	(4.17e-06)
replacementrate				-0.000945
				(0.00350)
Constant	8.472***	8.407***	7.939***	8.001***
	(0.114)	(0.118)	(0.236)	(0.313)
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Personal characteristics	Yes	Yes	Yes	Yes
Observations	161,323	161,323	161,323	161,323
R-squared	0.192	0.192	0.193	0.193

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Perhaps as expected, we find in all cases negative estimates for the coefficients of the national rates of unemployment and inflation (CPI). However, the coefficient of inflation is in no case significant, even at $p < 0.10$. Therefore, the data indicates that there is no association between the rate of inflation and subjective happiness. In all four regressions we control for personal employment status as well as the other personal characteristics described in the previous section, but unemployment is still significant in all four cases. Specifically, our estimates indicate that a one percentage point increase in the unemployment rate is associated with a 0.026-0.035 decrease in individual happiness on a 0-10 scale. In columns 2-4 we add additional macroeconomic control variables. We find that GDP growth is weakly significant or insignificant depending on the specification. On the other hand, we find that GDP per capita is significant and has the expected sign. Finally, we also control for the replacement rate and find that it is highly insignificant and has no effect on any of the other coefficients. Overall, introducing additional macroeconomic controls decreases the magnitude of the coefficient of unemployment, but does not change the level of significance in any case. Although inflation is not significantly different from zero in any of these regressions, we nonetheless report the relative magnitudes of the coefficients in Table 7 below. We generally find a relative magnitude around 2.43-5.70, but it is important to note that the inflation coefficient is not significantly different from zero in any of the four specifications.

Table 7: Coefficient ratios

Regression	1a	2a	3a	4a
$\hat{\pi}_2/\hat{\pi}_1$	2.95	5.70	2.43	2.53

Next, turning to our concern about heterogeneous effects of unemployment and inflation on the well-being of high- and low-income individuals, we construct subsamples for individuals belonging to the bottom three income deciles and top three income deciles respectively. We start by looking at the low-income subsample in Table 8 below.

Table 8: Microlevel Happiness regressions (bottom three income deciles-subsample)

VARIABLES	(1b) happy	(2b) happy	(3b) happy	(4b) happy
inflationcpi	0.0133	0.0204	0.00594	0.00843
	(0.0275)	(0.0257)	(0.0213)	(0.0210)
unemployment	-0.0549***	-0.0485***	-0.0327***	-0.0325***
	(0.0139)	(0.0127)	(0.0123)	(0.0121)
gdpgrowth		0.0256*	0.0198*	0.0181
		(0.0136)	(0.0114)	(0.0113)
gdpcapita			2.10e-05***	2.05e-05***
			(5.77e-06)	(5.82e-06)
replacementrate				-0.00797
				(0.00565)
Constant	8.733***	8.642***	7.693***	8.212***
	(0.192)	(0.201)	(0.352)	(0.493)
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Personal characteristics	Yes	Yes	Yes	Yes
Observations	51,903	51,903	51,903	51,903
R-squared	0.176	0.177	0.177	0.177

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Although the significance levels and the signs of the coefficients are in line with the whole sample, we nonetheless find coefficients of the unemployment rate that are greater in absolute magnitude than the previous coefficients. Furthermore, we also see that using only the top three income deciles subsample (see Table 9 below) results in the coefficient of unemployment becoming insignificant and inflation remaining insignificant. Notably, the magnitude of the unemployment coefficient decreases considerably in magnitude. Comparing these two subsamples, we find a coefficient of unemployment that is vastly larger for the bottom three income deciles compared to the top three income deciles, and ultimately the coefficient for the richer subsample is not significantly different from zero. On the other hand, the coefficients of personal unemployment are -0.53 and -0.52 (not reported in the tables) such that

becoming unemployed as a low-income individual is associated with the same decrease in happiness as for the whole sample. Combining these two findings, we may argue that the psychological effect of becoming unemployed is similar across the income distribution, but since low-income individuals are at a higher risk for becoming unemployed, the national rate of unemployment has a greater effect on them. In terms of relative coefficients, the decrease in happiness from becoming unemployed is equivalent to the decrease in happiness from an 9.7-16.3 percentage point increase in the national unemployment rate for the bottom three income deciles, whereas the coefficient of the national rate of unemployment is insignificant for the high-income subsample. Therefore, the poorest in society appear to be harder hit by an increase in the unemployment rate, regardless of the replacement rate. This is an indication that the poor benefit more in terms of utility from a lower unemployment rate than the general population. However, relating to our earlier exposition of the data, we see that we the top three income deciles are underrepresented and as such the samples are not entirely representative, which might introduce bias. Regarding the effect of inflation, it is important to note that the time period studied in the microeconomic regressions cover only the post-2008 subsample because of variable compatibility issues. Although previous papers, for example Hofstetter and Rosas (2021), have found a significant effect of inflation, this might be an indication that these preferences change over time, similar to the findings of Fischer and Huizinga (1982) and Blanchflower et al. (2014), and specifically that preferences for lower unemployment are higher during a recession.

Table 9: Microlevel happiness regressions (top three income deciles-subsample)

VARIABLES	(1c) happy	(2c) happy	(3c) happy	(4c) happy
inflationcpi	-0.00648	-0.00537	-0.00404	-0.00333
	(0.0143)	(0.0170)	(0.0171)	(0.0167)
unemployment	-0.0109	-0.0106	-0.0127	-0.0126
	(0.00854)	(0.00912)	(0.0102)	(0.0102)
gdpgrowth		0.00231	0.00299	0.00283
		(0.0112)	(0.0110)	(0.0110)
gdpcapita			-5.36e-06	-5.49e-06
			(4.28e-06)	(4.25e-06)
replacementrate				-0.000980
				(0.00452)
Constant	9.042***	9.032***	9.268***	9.333***
	(0.149)	(0.167)	(0.290)	(0.379)
Country fixed effects	Yes	Yes	Yes	Yes
Fixed year effects	Yes	Yes	Yes	Yes
Observations	40,967	40,967	40,967	40,967
R-squared	0.123	0.123	0.123	0.123

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

6.2. Macrolevel happiness regressions

As noted previously, the microlevel regressions are restricted to the time period 2010-2018. To use the whole sample, we aggregate all the microeconomic happiness data to a macrolevel by calculating the unconditional average for each country at each survey wave 2004-2018. We control for country fixed effects and fixed year effects in each regression as before and incrementally introduce additional controls as before.

Table 10: Macrolevel happiness regressions

VARIABLES	(1d) happy	(2d) happy	(3d) happy	(4d) happy
inflationcpi	-0.0245***	-0.0197**	-0.0194**	-0.0215**
	(0.00919)	(0.00900)	(0.00905)	(0.00901)
unemployment	-0.0334***	-0.0316***	-0.0327***	-0.0324***
	(0.00767)	(0.00758)	(0.00770)	(0.00771)
gdpgrowth		0.0164	0.0174*	0.0157
		(0.0101)	(0.0103)	(0.0107)
gdpcapita			-4.74e-06	-4.68e-06
			(7.54e-06)	(7.51e-06)
replacementrate				-0.00292
				(0.00218)
Constant	7.695***	7.624***	7.818***	8.019***
	(0.0888)	(0.0942)	(0.323)	(0.370)
Country fixed effects	Yes	Yes	Yes	Yes
Fixed year effects	Yes	Yes	Yes	Yes
Observations	177	177	177	177
R-squared	0.954	0.955	0.955	0.956

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As noted earlier, we find that the country fixed effects explain a large part of the variance in macrolevel happiness. The country dummies and time trends alone explain 0.94% of the variance in national happiness. Contrary to the previous microeconomic regressions, we find a coefficient of inflation that is significant at $p < 0.05$ in all four cases, such that the significance of inflation is robust after controlling for GDP growth (business cycle), GDP per capita (economic development) and replacement rate. On the other hand, the coefficient has the expected negative sign as earlier. Specifically, our estimates indicate that a one percentage point increase in the national unemployment rate is associated with a 0.0316-0.0334 decrease in national happiness on a 0-10 scale, and likewise a one percentage point increase in the consumer price index, i.e., inflation, is associated with a 0.0194-0.0245 decrease in national happiness. Alternatively, using standard deviations, a one percentage point increase in unemployment is associated with a decrease in happiness equal to approximately 0.05 standard deviations of

happiness, whereas a one percentage point increase in inflation is associated with a decrease in happiness equal to 0.03-0.04 standard deviations of happiness.

Following the same procedure as previously, we report the relative magnitudes of the coefficients in Table 11 below. Notably, we see that the ratios are a bit lower than for the microeconomic regressions 2010-2018, although the absolute magnitude of unemployment is still greater than that of inflation. We find a relative magnitude of 1.36-1.69, depending on the control variables, and both coefficients are significant at $p < 0.05$. Overall, these results, even though we use more controls and a different sample period, are very much comparable to Hofstetter & Rosas (2021) who found a relative magnitude of 1.3-1.8.

Table 11: Coefficient ratios

	1d	2d	3d	4d
$\hat{\alpha}_2/\hat{\alpha}_1$	1.36	1.60	1.69	1.51

6.2.1 Macrolevel subsample 2010-2018

In order to have comparable macro and micro samples, we report the macroeconomic regressions using only overlapping survey waves in Table 12 below.

Table 12: Macrolevel happiness regressions (2010-2018-subsample)

VARIABLES	(1) happy	(2) happy	(3) happy	(4) happy
inflationcpi	-0.0102	-0.00174	-0.00598	-0.00632
	(0.0189)	(0.0186)	(0.0172)	(0.0173)
unemployment	-0.0299***	-0.0258**	-0.0208*	-0.0208*
	(0.0113)	(0.0103)	(0.0112)	(0.0113)
gdpgrowth		0.0212*	0.0189*	0.0190*
		(0.0124)	(0.0112)	(0.0113)
gdpcapita			1.03e-05*	1.04e-05*
			(6.00e-06)	(6.02e-06)
replacementrate				0.000712
				(0.00477)
Constant	7.649***	7.564***	7.106***	7.059***
	(0.129)	(0.126)	(0.317)	(0.427)
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	112	112	112	112
R-squared	0.968	0.969	0.970	0.970

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Accordingly, we find that in no case is inflation significant, although we find the expected negative sign. Therefore, it appears that the cause of the insignificance of inflation

stems from the time period sampled and not the aggregated macroeconometric setup. Specifically, we find that a one percentage point increase in unemployment is associated with a 0.0208-0.0299 decrease in national happiness on a 0-10 scale, an estimate very much comparable to our previous results.

7. Sensitivity Analysis

7.1. Sensitivity regressions

Given the fact that we are using observational data, we will conduct a sensitivity analysis on our results to check if our findings are sensitive to additional controls and alternative specifications. As the micro- and macrolevel specifications lead to comparable results, we conduct sensitivity analysis only on the macrolevels specification as it allows us to examine a longer time-period.

Table 13: Sensitivity analysis for macrolevel happiness regressions

VARIABLES	(SA1) happy	(SA2) happy	(SA3) happy	(SA4) happy
inflationdeflator				-0.00842
				(0.00960)
inflationcpi	-0.0223**	-0.0152*	-0.258*	
	(0.0102)	(0.00896)	(0.140)	
unemployment	-0.0288***	-0.0297***	-0.362***	-0.0327***
	(0.00977)	(0.00775)	(0.115)	(0.00765)
gdpgrowth	0.0156	0.0139	0.0846	0.0205*
	(0.0106)	(0.0107)	(0.150)	(0.0108)
gdpcapita	-5.03e-06	-2.49e-06	2.02e-06	-4.79e-06
	(7.50e-06)	(7.35e-06)	(0.000186)	(7.24e-06)
replacementrate	-0.00308	-0.00309	-0.0394	-0.00194
	(0.00212)	(0.00218)	(0.0347)	(0.00225)
highinfla	0.00912			
	(0.0659)			
highunemp	-0.0510			
	(0.0903)			
goveffectiveness		0.412***		
		(0.114)		
Constant	8.024***	7.173***		7.913***
	(0.366)	(0.444)		(0.357)
Country fixed effects	Yes	Yes	Yes	Yes
Fixed year effects	Yes	Yes	Yes	Yes
Observations	177	177	177	177
R-squared (*pseudo*)	0.956	0.960	*0.315*	0.954

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

SA1: Firstly, one might speculate that the psychological effects of inflation and unemployment vary depending on the severity. Therefore, in a similar fashion to Blanchflower et al. (2014), we add dummies for high inflation and high unemployment respectively, where high inflation is defined as inflation in the 85th percentile or higher in the sample (3.81% inflation or higher) and likewise high unemployment is defined as an unemployment rate in the 85th percentile or higher in the sample (10.74% unemployment or higher). Admittedly these cutoff points are arbitrarily chosen, but the 85th percentile is chosen due to sample size restrictions (26 observations in the top 15th percentile). Interestingly, this does nothing to the statistical significance of the unemployment coefficient nor the inflation coefficient. Similarly, the dummies variables are both insignificant such that high unemployment and high inflation alone do not alter our prior results. Our estimate indicates that the tradeoff, defined as the relative magnitude, is 1.29. In Section 3 we similarly uncovered a notably lower mean and variance of inflation in our sample as compared to earlier studies, for example Hofstetter & Rosas (2021). As such, one explanation for the insignificance of these dummy variables might be related to moderate variation in the levels of inflation in our sample.

SA2: Although we have controlled for country fixed effects, we have not accounted for quality of government that can change over time. Therefore, in sensitivity regression 2 (SA2) in Table 13 above, we add a measurement of government effectiveness from our WWGI dataset as an additional control variable. In particular, goveffectiveness measures "the quality of civil services and the degree of its independence from political pressures", see World Bank (2022C) for more information. The index is measured on a -2.5 (least effective) to 2.5 scale (most effective). After controlling for government effectiveness, we observe that the coefficient of inflation decreases in magnitude, although its significance at $p < 0.10$ and negative sign are preserved. In this specification, we find a relative magnitude of 1.95.

SA3: Thirdly, as we are dealing with a limited dependent variable, it might be the case our OLS regressions are misspecified. To test this, we employ the Ordered Logit (Ologit) estimator. Ordered Logit is chosen over Ordered Probit because of the spread of the dependent variable that we discussed in Section 4. For an overview of the Ologit estimator, see Borooah (2002). Although the coefficients are not directly comparable, we nonetheless find the expected sign and the significance is preserved using the Ologit estimator. We therefore conclude that our estimates are not sensitive to the use of an alternative estimator that accounts for the limited dependent variable scale.

SA4: Fourthly, having access to an alternative measurement of inflation, namely the GDP deflator, we find that the effect of inflation is sensitive to the way inflation is measured as the

coefficient becomes insignificant when regressing happy on the GDP deflator instead of CPI inflation. Considering changes in consumer prices are more likely to be noticed by ordinary citizens, this result is not entirely unexpected. Furthermore, looking at the differences in variation and mean in Table 14, we see that the GDP deflator has a lower mean and a variance. The maximum observed value is also smaller. Therefore, changes in the GDP deflator are less extreme and less likely to be directly experienced by ordinary people. As such, we find no statistical relationship between the GDP deflator and happiness, although we do find in some cases a negative relationship between increases in the consumer price index and reported happiness. Our results are therefore sensitive to the way inflation is measured.

Table 14: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
inflationdeflator	177	2.139	2.126	-2.975	12.046
inflationcpi	177	2.254	2.171	-.922	15.402

7.2. Endogenous inflation

To address the issue of endogeneity, we reestimate the previous regressions by using landmass as an instrumental variable of inflation. In this setup we treat inflation as endogenous and assume that landmass can act as an instrument for inflation. As some countries changed landmasses slightly over time in the WDI dataset, the time-averaged landmasses are reported in Appendix III. In our case, we are dealing with European data where a large portion of the sampled countries are members of the European Union, which might also weaken landmass as an instrument because of economic integration. In any case, we assume that landmass is uncorrelated with the error and that landmass does not affect personal happiness directly. Firstly, in Table 15 below, we report the first stage of the IV estimates using the level and log of landmass respectively as the instrument for inflation.

Table 15: Macrolevel happiness IV-regression (first stage)

VARIABLES	(1) inflationcpi	(2) inflationcpi
unemployment	-0.0216	-0.0351
	(0.0458)	(0.0465)
gdpgrowth	-0.170*	-0.176*
	(0.100)	(0.0987)
landmass	-0.000389**	
	(0.000150)	
loglandmass		-28.72**
		(13.56)
Constant	35.21***	328.4**
	(12.48)	(153.7)

Country fixed effects	Yes	Yes
Fixed year effects	Yes	Yes
Observations	177	177
R-squared	0.719	0.719

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Firstly, we find a negative sign for the landmass coefficients, such that larger countries in our sample have lower levels of inflation. Furthermore, we also find that the level and log of landmass are significant at $p < 0.05$. However, we see in the first stage regressions that the level of landmass and log of landmass have t-values of -2.59 and -2.12, respectively. Therefore, these two variables act as weak instruments for inflation as generally a t-value of approximately 3 (in absolute terms) is the minimum requirement for a strong instrument. Ultimately, using a weak instrument can lead to a spurious result. Nonetheless, we report the IV estimates below.

Table 16: Macrolevel IV regressions (second stage)

VARIABLES	(1) happy	(2) happy
inflationcpi	-0.133**	-0.0957**
	(0.0532)	(0.0479)
unemployment	-0.0348***	-0.0337***
	(0.00837)	(0.00741)
gdpgrowth	-0.00330	0.00313
	(0.0140)	(0.0119)
Constant	7.980***	7.864***
	(0.182)	(0.161)
Country fixed effects	Yes	Yes
Fixed year effects	Yes	Yes
Observations	177	177
R-squared	0.914	0.936

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As we can see from the regression table, we now obtain an effect of inflation that is vastly different and more statistically significant. Our IV estimate indicates that a one percentage point increase in inflation is associated with a 0.096-0.133 decrease in average national happiness. We find that the magnitude of the inflation coefficient is approximately 3-4 times larger than that of unemployment. As such, we find using the IV approach a relative coefficient ratio of 0.26-0.35 which is notably different from our previous findings. Although the landmass variables have the expected sign and significance, their t-values fall short of the approximate -3 cutoff point. Therefore, these are weak instruments. Overall, the IV estimate decreases the estimate of the effect of inflation rather than increases it as our control strategies

have done. However, as we are dealing with weak instruments and because unemployment also might be endogenous, it is difficult to tell whether the IV estimator performs better than the OLS estimator with different control strategies. One can only speculate why the IV estimate for inflation is larger than the OLS estimate, but one possible explanation is that during times of higher than usual national happiness people tend to spend more on consumer goods which therefore increases inflation; using landmass as an instrument can in this way remove this endogenous effect from the coefficient, leaving only the negative, true effect of inflation on happiness.

8. Discussion

Overall, the pattern that emerges from our results is that the relationship between unemployment and subjective happiness is quite robust. In all cases we have found a statistically significant marginal effect of unemployment that is, according to most of our estimates, approximately equal to -0.03 on a 0-10 scale. The magnitude of the coefficient depends on demographic subsample and time period studied, with the unemployment rate having a stronger effect on low-income individuals than high-income individuals. On the other hand, we have only in some cases found a statistically significant effect of inflation on happiness. Generally, we have found an insignificant effect of inflation for the time period 2010-2018, but a significant effect for the whole period 2004-2018. However, as observed from the changes in R^2, the inflation and unemployment rates collectively explain a miniscule part of the variance in happiness, even though the marginal effect themselves are significant. Despite using additional control variables and newer data, our results largely mirror those of the literature, specifically Fischer and Huizinga (1982) and Blanchflower et al. (2014) in that the preference for lower unemployment increases during a recession. Similarly, we have found a sign and statistical significance for unemployment and inflation that are in line with Di Tella et al. (2003) and Hofstetter & Rosas (2021). Unlike most of the literature, we have also tried to deal with problems of endogeneity using landmass as an instrumental variable for inflation as an additional robustness check. The sign, magnitude and significance of unemployment were preserved using the IV estimator, while the magnitude and significance of inflation increased. However, it is possible that landmass as an instrument for inflation is not sensible within our specific context as a large portion of the sampled countries are highly integrated in the European Union. Furthermore, the instrument turned out to be weak and we were also not able to find a reasonable instrument for unemployment, which is why we ultimately advise against relying on this IV estimate.

In line with our hypothesis, we find that indeed that $\frac{\partial W(\pi_t,u_t,X_{it},M_{it})}{\partial u_t} < 0$, i.e., the social welfare function, which we interpret as subjective happiness, is decreasing in unemployment. Specifically, using subjective happiness as a proxy for welfare, a one percentage point increase in unemployment is associated with approximately 0.03 point decrease in happiness. This result holds both for our macroeconometric as well as microeconomtric regressions. Controlling for an array of individual characteristics in our microeconometric regressions, including employment status and personal household income, did not alter this result either, nor did controlling for GDP growth or GDP per capita lead to a different result. However, the coefficient of unemployment changes depending on the subsample. In particular, the absolute magnitude of the coefficient of unemployment increases in size when sampling only low-income deciles. On the other hand, the absolute magnitude of the coefficient decreases and becomes insignificant when sampling only high-income deciles. As such, our results indicate that preferences for unemployment are not homogenous across income deciles. Considering the fact that richer households have higher levels of job security and wealth to rely on during periods of unemployment, this result is not entirely unexpected. Ultimately, however, we must be aware that the ESS does not contain a wholly representative sample of household incomes.

However, much like with the case of unemployment, we find heterogeneous effects of inflation that depend partly on the time period studied. Furthermore, the inclusion of control variables tends to decrease the magnitude of the inflation coefficient. We see that controlling for government effectiveness reduces the statistical significance of inflation but not unemployment. During this period of relatively low inflation, we find that inflation only weakly predicts happiness. Similarly, Hofstetter & Rosas (2021) found in a subsample of countries with moderate inflation that the significance of inflation disappeared. Correspondingly, we find no association between happiness and inflation in Europe during the period 2010-2018. Although our sensitivity analysis (SA1) using dummies for high inflation and high unemployment respectively indicate that there is no standalone effect on happiness for countries belonging to the 85th percentiles in our sample, we must bear in mind that our sample contains a notably smaller variance in inflation that related studies. It is possible that a sample with higher variance in inflation could uncover a standalone effect of very high inflation on happiness. Similarly, we find that using the GDP deflator, which has a smaller variance and mean than CPI inflation, leads to an insignificant relationship between happiness and inflation.

In general, we find weak evidence that $\frac{\partial W(\pi_t,u_t,X_{it},M_{it})}{\partial \pi_t} < 0$, i.e., that the social welfare function is decreasing in inflation. For the whole sample in the macroeconometric setup, the

issue is that the OLS estimate leads to a relative coefficient weight 1.36-1.69, whereas the IV estimate leads to a relative coefficient weight 0.26-0.35, although inflation is significant in both cases. It is entirely possible that using an instrument for the unemployment rate as well could restore the original ratio and, as noted earlier, we advise against relying on this IV estimate. However, we want to stress that issues of endogeneity may play a role in our estimates, even though we have tried to circumvent this using several control variables. Using data from 1995, Easterly & Fischer (2001) found that the poor are more likely than the rich to mention inflation as a top national concern. This is at odds with our results which indicate that since 2008, the poor are more concerned about unemployment than inflation. However, in line with Fischer and Huizinga (1982) and Blanchflower et al. (2014), we find that the role of unemployment is higher during a recession, which our 2010-2018 subsample also shows. Specifically, Blanchflower et al. (2014) found that European citizens in May 2010 considered unemployment was a more pressing economic issue over inflation by a factor of 2.5.

Returning to our original inspiration for this paper, namely Okun's misery index, we have overall found a more robust and larger coefficient (in absolute terms) for unemployment than inflation. Following the method of the literature, our point estimates indicate that $\left|\frac{\partial W(\pi_t,u_t,X_{it},M_{it})}{\partial u_t}\right| > \left|\frac{\partial W(\pi_t,u_t,X_{it},M_{it})}{\partial \pi_t}\right|$, i.e., that the marginal effect of unemployment is greater than that of inflation. Using the figures in Table 11, we plot the misery indices with different weights in Figure 6 below.

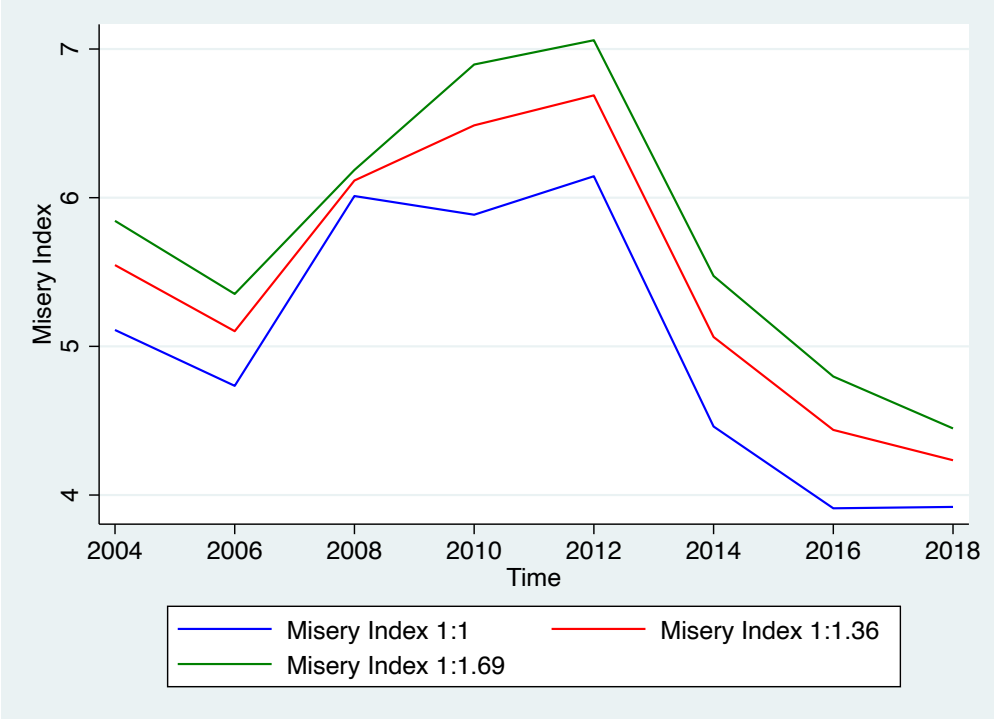

Figure 6: Misery indices with different weight (pooled time-series)

As we can see, using equal weights leads to a slight understatement of the reported misery caused by inflation and unemployment (according to our point estimates), as the effect of inflation is given a disproportionately high weight in comparison to unemployment. In order to maximize the total social welfare of its citizenry, central banks must make as realistic assumptions as possible concerning preferences for inflation versus unemployment. In this paper we have uncovered evidence that unemployment has a greater and more robust negative effect on welfare than inflation. Formally, if we consider a generic loss function of a central bank:

$$\mathcal{L} = \alpha(u_t - u_e)^2 + \beta(\pi_t - \pi_e)^2$$

that is to be minimized subject to some restraint(s), our results indicate that $\frac{\alpha}{\beta} > 1$. Much like Debortoli et al. (2019) we find that taking economic activity into monetary policy decisions increases social welfare. Furthermore, our results indicate that preferences change after a recession when the preference for lower unemployment becomes stronger. Naturally, as variation in unemployment might be cyclical or permanent, there are arguments against putting the responsibility of lowering unemployment on the central bank as opposed to politicians to enact legislative labor market reforms. As our results indicate that the top three income deciles are more negatively affected by unemployment than the top three income deciles, one might postulate that this effect is due to job insecurity amongst the poor, which labor market reforms can alleviate. For example, as suggested by Easterlin (2021), countries with low levels of GDP per capita but well-functioning social safety nets have higher levels of national happiness. Ultimately, of course, monetary policy cannot permanently lower unemployment without introducing higher and higher levels of inflation. However, our results indicate that there is no standalone effect of very high inflation. As our results are sensitive to time period studied, we refrain from concluding that social welfare is not affected by inflation, but underline that, in accordance with other survey questions (see, Fischer and Huizinga, 1982) that unemployment becomes more urgent during a recession. This particularly complicates any policy recommendations for the aftermath of the Corona pandemic where unemployment is high in some sectors and inflation is surging.

9. Conclusion

Inspired by Okun's Misery Index and the recent surge in inflation following the Corona pandemic, we have in this paper studied the subjective happiness tradeoff between inflation and unemployment in Europe from 2004 to 2018 using survey data, a time period not fully

investigated by the literature. Specifically, we have made use of macro- and microlevel specifications in order to answer our research question. In accordance with earlier studies, we have uncovered a negative statistical relationship between unemployment and happiness that is robust to several control variables not controlled for in related papers, including government effectiveness. On the other hand, the relationship between inflation and happiness is sensitive to time period sampled and is weakened by the inclusion of control variables. In certain specifications we have uncovered relative weights that are in line with the literature, namely that increases in unemployment are associated with larger negative movements in happiness than inflation. Furthermore, in general, we find that the poorest bottom three income deciles care more about employment than inflation in comparison to the top three income deciles, a result that is not unexpected given different levels of job security and preexisting wealth. At last, we confirm the findings of Blanchflower et al. (2014), that the relative effect of unemployment versus inflation on happiness increases during a recession. Our results for the whole sample are largely in line with previous studies such as Di Tella et al. (2003) and Wolfers (2003), i.e., inflation and unemployment are both associated with lower levels of happiness, especially unemployment. However, our paper also contributes to the current literature by highlighting that there might be endogeneity issues at play. Although our instrument for inflation turned out to be weak in the end, we encourage the continued search for reliable and better instruments for the national rate of inflation and unemployment, something not often discussed in the literature. Given our findings regarding the stable relationship between unemployment and happiness, both on an individual and national level, future research may look at the differences in happiness for countries with job guarantee programs. More importantly, a longer time series will help uncover the long-term relationships between happiness, inflation, and unemployment by smoothing out the effect of recessions and allowing for the introduction of instruments, one of which might include landmass. However, as macroeconomic instruments are difficult to come by, future research may instead directly use questionnaires that measure people's concerns about unemployment and inflation and their subjective happiness.

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Appendix I

Tabulation of hinctnta

Household's total net income, all sources	Freq.	Percent	Cum.
J - 1st decile	19799	9.84	9.84
R - 2nd decile	22123	11.00	20.84
C - 3rd decile	22622	11.24	32.08
M - 4th decile	22387	11.13	43.21
F - 5th decile	21896	10.88	54.09
S - 6th decile	20648	10.26	64.36
K - 7th decile	20483	10.18	74.54
P - 8th decile	19185	9.54	84.08
D - 9th decile	16174	8.04	92.12
H - 10th decile	15861	7.88	100.00
Total	201178	100.00	

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
employmentstat	333244	3.201	2.61	1	9
agea	333651	48.539	18.643	13	123
hhincome	201176	5.248	2.773	1	10
educ	333988	3.358	3.255	0	55
marriagestat	205253	3.159	2.268	1	6

Appendix II

Observed frequencies of hhincome; expected frequencies equal

hhincome	observed	expected	difference	Pearson
1	19799	20117.8	-318.8	-2.248
2	22123	20117.8	2005.2	14.137
3	22622	20117.8	2504.2	17.655
4	22387	20117.8	2269.2	15.999
5	21896	20117.8	1778.2	12.537
6	20648	20117.8	530.2	3.738
7	20483	20117.8	365.2	2.575
8	19185	20117.8	-932.8	-6.577
9	16174	20117.8	-3943.8	-27.805
10	15861	20117.8	-4256.8	-30.012

Appendix III

Country	Landmass (km^2)
Austria	82551.8
Belgium	30280
Bulgaria	108572.22
Croatia	56590
Cyprus	9240
Czechia	77235.296
Denmark	41504.845
Estonia	42874.197
Finland	304077.38
France	547558.94
Germany	348846.35
Greece	128900
Hungary	90389.171
Iceland	100412.56
Ireland	68890
Israel	21640
Italy	295442.51
Latvia	62162.422
Luxembourg	2430
Netherlands	33726.495
Norway	365207.25
Poland	306256.41
Portugal	91539.177
Slovakia	48093.87
Slovenia	20142.341
Spain	499491.9
Sweden	409063.68
Switzerland	39517.474
Turkey	769630
United Kingdom	241930