

Macroeconomic Preferences by Income and Education Level: Evidence from Subjective Well-Being Data

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Abstract: Using subjective well-being data for more than 91,000 individuals in 30 OECD countries from 1990 to 2008, we study how people's implicit aversion towards inflation and unemployment varies with income and education. While inflation aversion decreases with income and increases with the education level, unemployment aversion is independent of income and decreases with the level of education. In spite of income and education dependence, aversion towards inflation is less than aversion towards unemployment not just on average but at all levels of income and education. This suggests that issues of social incidence are not a dominant concern for macroeconomic policy making on anti-inflation and anti-unemployment policies.

Keywords: Inflation, Unemployment, Preference, Social incidence, Subjective well-being

JEL Classifications: E61, E31, E24, I31

1. Introduction

As in other fields of economic policy making, the effects of and preferences for anti-inflation and anti-unemployment policy are likely to differ across socio-economic groups. In particular, they may differ between the well-off and the less well-off in society, and this issue, to which we refer as social incidence, is often invoked in controversies over macroeconomic priorities: Are anti-inflation and anti-unemployment policies "pro-poor" or "pro-rich" (Scheve 2004; Jayadev 2006, 2008)?

A number of stated-preference studies has addressed this issue using results of international surveys in which individuals were asked whether they think inflation is an important national problem and how important it is in comparison with unemployment and other problems (Easterly and Fischer 2001; Scheve 2004; Jayadev 2006, 2008). These studies suggest that inflation aversion *per se* decreases with income and the education level (Easterly and Fischer 2001) whereas aversion towards inflation *relative* to unemployment is greater among the well-off than among the less well-off (Scheve 2004; Jayadev 2006, 2008).

Another line of research has followed an experience-based approach to measuring macroeconomic preferences (Di Tella et al. 2001, 2003; Wolfers 2003; Welsch 2011). These papers have studied inflation aversion and unemployment aversion in an implicit way by measuring the correlation between people's subjective well-being and the levels of inflation and unemployment prevailing in their countries. This type of analysis has typically found that national unemployment is

of greater concern to the average person than is inflation, but has largely neglected the issue of preference heterogeneity between the well-off and the less well-off.

The present paper follows the stated-preference studies by differentiating people's macro-economic priorities by income and education level, but does so by using the well-being approach to identifying those priorities. It combines life satisfaction data involving 91,195 individuals in 30 OECD countries from 1990 to 2008, with macroeconomic data to assess how inflation and unemployment have affected people's subjective well-being.¹ Following earlier literature we take the magnitudes of the respective coefficients to indicate the strength of absolute inflation and unemployment aversion, whereas their ratio indicates relative inflation-unemployment aversion. By differentiating these effects according to people's income category and education level, we measure not just how strongly an average person dislikes inflation and unemployment, but also how absolute inflation and unemployment aversion and relative inflation-unemployment aversion vary with these characteristics.

Our main findings are as follows: (1) Absolute inflation aversion decreases with income, but increases with the education level. (2) Absolute unemployment aversion is independent of income, but decreases with the education level. (3) Findings (1) and (2) together imply that relative inflation-unemployment aversion decreases with income and increases with the education level. (4) In spite of income and education dependence, inflation aversion is less than unemployment aversion not just on average, but for all income and education levels, that is, the relative inflation-unemployment aversion of both the well-off and the less well-off is less than unity.

From findings (1) – (3) we conclude that with regard to their influence on macroeconomic preferences low levels of income and of education represent different dimensions of being disadvantaged. We interpret those findings in terms of different channels through which income and education may affect those preferences. From finding (4) we conclude that, in spite of preference heterogeneity by income and education level, the social incidence of inflation and unemployment is not a dominant concern for macroeconomic policy making on anti-inflation and anti-unemployment policies.

This paper is organized as follows. Section 2 provides a review of the previous literature. Section 3 presents the data and econometric approach. Section 4 reports and discusses the empirical results. Section 5 concludes.

2. Literature Review

Several reasons have been discussed for why inflation may be more or less detrimental to the poor than the non-poor (Easterly and Fischer 2001). On the one hand, the portfolios of the poor may have a larger share of cash and the poor may be less likely than the rich to have access to financial instruments that hedge in some way against inflation. In addition, the poor may depend more than the rich on state-determined income that is not fully indexed. An additional consideration involves human capital as a hedge against inflation. According to this reasoning the poor, to the extent that they are less well educated, feel less protected against inflation. On the other hand, the non-poor may be more affected by inflation through non-indexed progressivity of the tax system or they may simply know more about the damage that inflation can do to the economy.

¹ Self-rated life satisfaction (elicited in surveys) is a common measure of subjective well-being. Data on subjective well-being are accepted as a reasonably good approximation of utility in a growing literature in economics (Kahneman and Krueger 2006). The relationship between life satisfaction (or happiness) and utility is extensively discussed in, e.g., Frey and Stutzer (2002), along with methodological issues concerning the utilization of subjective data in economic analysis.

As to unemployment, a high national unemployment rate may affect people *in addition* to personally being unemployed (Di Tella et al. 2001). Specifically, high national unemployment affects everybody through the higher chance of losing their job, the higher taxes to pay unemployment benefits or higher crime rates.

Considering inflation together with unemployment, it has been argued that the poor may have a higher perceived risk of unemployment, which would make them think of inflation as a less serious problem *relative* to unemployment (Scheve 2004). This latter reasoning applies not just to the differentiation of inflation by income but also by skill level and social class (Jayadev 2008).

Due to existing ambiguities, preferences over inflation and unemployment by income as well as by education are an empirical issue. Previous studies on macroeconomic preferences can be classified in terms of their method (stated-preference approach or experience-based approach) and their focus. Table 1 presents an overview of some key contributions.

Easterly and Fischer (2001) use the statements of about 32,000 survey respondents in 19 developing and 19 developed countries in 1995 to study absolute inflation aversion. Their key dependent variable is a zero/one variable that indicates whether or not a respondent mentions “inflation and high prices” among the top 2 or 3 concerns from a list of 4 economic and 14 non-economic issues. They run Probit regressions of this variable on dummy variables for seven income categories that range from “rich” to “very poor” along with three levels of educational attainment. They find that the poor and the less well educated are significantly more likely than the non-poor and the better educated to mention inflation as a top national concern. This finding is robust to inclusion of occupational group, age and sex as additional attributes that may affect the attitude towards inflation.

Rather than the question of whether or not people consider inflation to be a top national concern (absolute inflation aversion), Scheve (2004) addresses people’s attitude on whether curbing inflation or reducing unemployment should be given greater priority (relative inflation aversion) and studies how this attitude varies with income. He uses a pooled cross-section of data from 20 advanced economies, involving about 55,000 individuals in the years 1976, 1985, 1990, 1996 and 1997. By running logit regressions of the zero/one variable “inflation priority” on a number of explanatory variables he finds that people’s stated relative inflation aversion is increasing in their income. This finding is robust to inclusion of educational attainment, age, sex and a dummy variable for being unemployed as additional explanatory variables.

A similar analysis of stated relative inflation aversion is provided by Jayadev (2006), using a cross section of about 14,000 individuals in 17 mostly developed countries in 1996. He finds the probability that people give “keeping down inflation” priority over “keeping down unemployment” to be increasing in income, independent of whether or not controlling for educational attainment, age, sex, and unemployed status.

Jayadev (2008) uses the same data and dependent variable to study how relative inflation aversion varies with skill level and “class”. He finds that less skilled workers and people from self-assessed lower class are less likely to prioritize keeping down inflation rather than unemployment. These results are robust to inclusion of income, age, sex, and unemployed status.

All of these studies find measures of average relative inflation aversion to be below one. In the data of Easterly and Fischer (2001), the percentage of respondents that mention inflation as a top national concern divided by the percentage that mention recession and unemployment as a top national concern is about 0.7. In both the Scheve (2004) and the Jayadev (2006, 2008) data, the overall fraction of people who give priority to curbing inflation over fighting unemployment is about 0.4.

Table 1. Survey of related literature

<i>Method</i>	<i>Study</i>	<i>Average relative inflation aversion</i>	<i>Absolute inflation aversion differing by...</i>	<i>Relative inflation aversion differing by...</i>	<i>Additional explanatory variables</i>
Stated preference	Easterly and Fischer (2001)	0.71 ^{a)}	Income: ↓ Education: ↓		Occupational group, age, sex
	Scheve (2004)	0.39 ^{b)}		Income: ↑	Education, unemployed status, age, sex
	Jayadev (2006)	0.41 ^{c)}		Income: ↑	Education, unemployed status, age, sex
	Jayadev 2008	0.41 ^{d)}		Class: ↑	Income, unemployed status, age, sex
Experience-based	Di Tella et al. (2001)	0.43 – 0.70 ^{e)}			
	Di Tella et al. (2003)	0.52 ^{f)}			GDP per capita, benefit replacement rate
	Wolfers (2003)	0.21 ^{g)}			Fluctuations in inflation and unemployment
	Welsch (2011)	0.50 – 0.96 ^{h)}			GDP growth, GDP per capita, institutions
	Blanch. et al. (2014)	0.22 – 0.36 ⁱ⁾			GDP growth
	This study	0.31	Income: ↓ Education: ↑	Income: ↓ Education: ↑	GDP growth, GDP per capita, unemployed status, age, sex

a) Percentage of respondents that mention inflation as a top national concern divided by percentage that mention recession and unemployment as a top national concern (Easterly and Fischer 2001, Table 1); b) percentage of respondents that give priority to combating inflation rather than unemployment (Scheve 2004, Table 1); c) percentage of respondents that give priority to combating inflation rather than unemployment (Jayadev 2006, Table 1); d) percentage of respondents that give priority to combating inflation rather than unemployment (Jayadev 2008, Table 1); e) ratio of coefficients on inflation and unemployment (Di Tella et al. 2001, Table 1, regressions (1) and (2)); f) ratio of coefficients on inflation and unemployment (Di Tella et al. 2003, Table 10, regression (1)); g) ratio of coefficients on inflation and unemployment (Wolfers 2003, Tables 1 and 4, micro data); h) ratio of coefficients on inflation and unemployment (Welsch 2011, Table 3, regression 2 and Table A2, regression 4); i) ratio of coefficients on inflation and unemployment (Blanchflower et al. 2014, Table 4a, regressions 2 and 3).

Average relative inflation aversion has also been studied by means of an experience-based approach, that is, by measuring how people's subjective well-being (SWB) in a number of countries and years varies with prevailing rates of inflation and unemployment. Di Tella et al. (2001) used SWB data from 12 member countries of the European Union (EU12), 1975-1991. They found the coefficients on inflation and unemployment in their well-being regressions to be significantly negative. Average relative inflation aversion, as measured by the ratio of those coefficients, ranges from 0.43 to 0.70. Di Tella et al. (2003) slightly extended that data set to cover the years 1975-1992 and found a ratio of 0.52, controlling for GDP per capita and the benefit replacement rate. Wolfers (2003) extended the European Union data set to 16 countries, 1973-1998 and found an average relative

inflation aversion, as defined above, of 0.21, controlling for fluctuations in inflation and unemployment rates.

Welsch (2011), using SWB data from EU12, 1992-2002, and controlling for per capita GDP and institutional variables, found the measure of average relative inflation aversion to be 0.96 when GDP growth is controlled for and 0.50 when it is not controlled for. Blanchflower et al. (2014) used data for 30 European countries covering the period 1975 to 2013 and found the average relative inflation aversion to be in the range of 0.22 to 0.36.

Unlike the previous literature, which has focused on one out of three issues, (a) average relative inflation aversion (Di Tella et al. 2001, 2003; Wolfers 2003, Welsch 2011), (b) differing absolute inflation aversion by income and education (Easterly and Fischer 2001), or (c) differing relative inflation-unemployment aversion by income or class (Scheve 2004; Jayadev 2006, 2008), the remainder of this paper addresses all of the issues (a) – (c) within a common, experience-based framework.²

3. Empirical Framework

3.1 Data

Though one of the purposes of this paper is to extend the previous macroeconomic well-being literature to non-European countries, we restrict ourselves to developed countries (OECD countries) because unemployment rates in developing countries are often not meaningful due to the existence of large informal sectors of the economy (Blanchard et al. 2010). Our data comes from two main sources. The rates of inflation and unemployment (as well as GDP growth and per capita GDP) are taken from the OECD online database, available at <http://www.oecd.org>. Data on people's life satisfaction and their socio-demographic characteristics comes from the World Values Surveys, see <http://www.worldvaluessurvey.org>.

The World Values Surveys (WVS) were conducted in four so-called waves around 1990, 1995, 2000, and 2005. The WVS methodology consists of the administration of detailed questionnaires in face-to-face interviews. The questionnaires from the most recent waves have consisted of about 250 questions. In each country the questionnaires are administered to between about 1,000 and 3,500 persons with an average in the fourth wave of about 1,330 interviews per country. The data used in this study refer to 1990 (first wave), 1995-1999 (second wave), 2000-2001 (third wave) and 2005-2008 (fourth wave).

The variables from the WVS used in this study refer to life satisfaction and to the interviewees' socio-demographic characteristics, in particular income and educational attainment. Life satisfaction, which will be our dependent variable, is the response to the following question: "All things considered, how satisfied are you with your life as a whole these days?" and is measured on a 10-point scale, where 1 = "dissatisfied" and 10 = "satisfied".

Self-assessed income is measured on a scale from 1 = "low income" to 10 = "high income". In our main analysis, we aggregated those categories into four income classes which approximately correspond to quartiles: low income (first two categories, corresponding to the bottom 22 percent of

² Scheve (2004) states that the experience-based approach (subjective well-being approach) "is well suited to producing a single estimate of how inflation and unemployment affect welfare. However, this approach does not allow analysis of variation in macroeconomic priorities across individuals". This latter assessment, however, applies only to the specific, two-stage procedure adopted by Di Tella et al. (2001), to which Scheve (2004) refers.

respondents), lower middle income (third and fourth category, comprising 28 percent), upper middle income (fifth and sixth category, comprising 23 percent), and high income (seventh to tenth category, comprising 27 percent). In robustness checks we considered alternative measurements of income.

The levels of education whose influence on inflation and unemployment aversion will be examined are “some primary education” (26.4 percent), “some secondary education” (49.8 percent), and “at least some university education” (23.7 percent). Control variables used in additional robustness checks are age (in ten-year blocks), sex (female), and being unemployed.

In the empirical analysis we will use two different samples. The larger sample contains 91,195 valid Obs. in 30 member countries of OECD.³ We have 77 country-year clusters, where the number of years per country ranges from one to four (averaging about 2.5). This sample does not include the education level due to unavailability of this variable for some countries mainly in the first wave. The smaller sample includes educational attainment; it consists of 66,699 Obs. in 58 country-year clusters. Summary statistics of the main variables in those two samples are available upon request.

3.2 Econometric Approach

A basic version of our life satisfaction regression is stated as follows:

$$LS_{ict} = \beta_p p_{ct} + \beta_u u_{ct} + \beta_m macro_{ct} + \beta_d demographics_{ict} + \sum_r \gamma_r region_r + \sum_w \delta_w wave_w + \varepsilon_{ict} \quad (1)$$

where LS_{ict} denotes life satisfaction of individual i in country c and year t . The variables p_{ct} and u_{ct} are the rates of inflation and unemployment, respectively. The unemployment and inflation rates are measured in percent. The vector $macro_{ct}$ comprises macroeconomic controls (annual GDP growth rate and GDP per capita) whereas the vector $demographics_{ict}$ comprises individual i 's sociodemographic characteristics (age, sex, civil status, number of children, employment status, income, education level). The variables $region_r$ and $wave_w$ are region and wave dummies, and ε_{ict} is an error term.⁴

Extended versions of eq. (1) include interactions of the inflation and unemployment rates with dummy variables for income class and education level as well as (in robustness checks) other personal characteristics. These equations will allow us to study if and how the effects of inflation and unemployment on people's well-being vary with those attributes.

The interaction model including income and education categories takes the following form:

$$LS_{ict} = (\beta_p^0 + \sum_{j \neq 0} \beta_{p,inc}^j d_{inc}^j + \sum_{k \neq 0} \beta_{p,edu}^k d_{edu}^k) \cdot p_{ct} + (\beta_u^0 + \sum_{j \neq 0} \beta_{u,inc}^j d_{inc}^j + \sum_{k \neq 0} \beta_{u,edu}^k d_{edu}^k) \cdot u_{ct} + \dots \quad (2)$$

³ Following OECD conventions, the countries are grouped in six regions: Canada, Mexico, USA (region OECD-America); Japan, Korea (region OECD-Asia); Australia, New Zealand (region OECD-Pacific); Austria, Belgium, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Switzerland, Spain, UK (region OECD-Western Europe); Czech Republic, Hungary, Poland, Slovak Republic, Turkey (region OECD Eastern Europe); Denmark, Finland, Iceland, Norway, Sweden (region OECD-Scandinavia). OECD countries Chile and Slovenia are excluded because data are incomplete.

⁴ Our tattered sample (with the number of years per country ranging from one to four) does not permit to use country dummies. Instead, we use region dummies since they have been found to effectively control for unobserved country heterogeneity in WVS data when degrees of freedom do not permit the use of country fixed effects (Fischer 2010). Region dummies have been frequently used in the pertinent literature, e.g., in Helliwell (2003). The definition of regions is given in footnote 3.

In this formulation, the coefficients β_p^0 and β_u^0 refer to people belonging to the base category (lowest income category, $j = 0$, and lowest education category, $k = 0$). The variables d_{inc}^j are income category dummies that take the value 1 if people belong to income category $j \neq 0$ and the value 0 otherwise. The variables d_{edu}^k are education category dummies that take the value 1 if people belong to education category $k \neq 0$ and the value 0 otherwise. The coefficients $\beta_{p,inc}^j, j \neq 0$, indicate by how much the effect of inflation for a person from income group $j \neq 0$ and the lowest education category differs from the effect for a person with lowest income and lowest education. The absolute effect for a person from income category $j \neq 0$ and the lowest education category is $\beta_p^0 + \beta_{p,inc}^j$. The coefficients $\beta_{p,edu}^k, k \neq 0$, indicate by how much the effect of inflation for a person from education category $k \neq 0$ and the lowest income category differs from the effect for a person with lowest income and lowest education. The absolute effect for a person from the education category $k \neq 0$ and the lowest income category is $\beta_p^0 + \beta_{p,edu}^k$. The coefficients for unemployment ($\beta_u^0, \beta_{u,inc}^j, \beta_{u,edu}^k$) are to be interpreted in an analogous way.

When we consider income as the *only* conditioning variable (which is our basic version of the interaction model), the base category refers to persons from the lowest income category without regard to the education level, and the coefficients $\beta_{p,inc}^j$ and $\beta_{u,inc}^j$ capture the difference from that base category. When we jointly consider *more than two* attributes as conditioning variables, the base category and its associated coefficient refer to one particular configuration of those attributes and the other coefficients must be interpreted relative to that base category.⁵

There has been some debate in the literature on whether life satisfaction should be treated as a cardinal phenomenon. If not, an ordered discrete choice model should be estimated rather than a linear regression model. Research that has applied both approaches has found little difference between the results of a linear regression and an ordered logit or Probit (Ferrer-i-Carbonell and Frijters 2004). To facilitate interpretation, we use least squares as the primary method and an ordered Probit as a robustness check. We report heteroskedasticity robust standard errors, corrected for clustering at the country-year level.⁶

4. Empirical Results

4.1 Macroeconomic Preferences by Income

Table 2 reports estimation results on the relationship between life satisfaction and the rates of inflation and unemployment and on how these relationships vary with income. Our discussion focuses on the main relationships of interest.⁷

⁵ We performed Regression Specification Error Tests (RESET) on our models as well as on models which include additional terms, such as interactions between inflation and unemployment. We found that the differentiation of inflation and unemployment by income and education (eq.(2)) led to an improvement over the undifferentiated model (eq. (1)) whereas including additional terms did not.

⁶ As an alternative to adjusting standard errors, Di Tella et al. (2001) and Donald and Lang (2007) have proposed (versions of) two-stage regression. As pointed out by Scheve (2004), such approaches do not allow analysis of variation in macroeconomic priorities across individuals (cf. footnote 2 above).

⁷ With respect to the individual-level socio-demographic variables, all our regressions yield the same qualitative results, and these results are consistent with common findings for developed countries (see, e.g., Frey and Stutzer 2002): positive and significant coefficients on being female, being married or

Table 2. Main estimation results

	<i>Regression 1</i>		<i>Regression 2</i>		
	<i>coefficient</i>	<i>t-value</i>	<i>coefficient</i>	<i>t-value</i> (different from base category) ^{a)}	<i>t-value</i> (different from zero) ^{b)}
Constant	7.692	32.33	7.800	32.59	
Male	Base category (omitted)		Base category (omitted)		
Female	0.112	3.22	0.110	3.25	
Person in 10 \$	Base category (omitted)		Base category (omitted)		
Person in 20 \$	-0.171	4.75	-0.172	4.83	
Person in 30 \$	-0.425	9.09	-0.426	9.05	
Person in 40 \$	-0.588	10.94	-0.589	11.00	
Person in 50 \$	-0.544	9.92	-0.547	10.09	
Person in 60 \$	-0.258	3.52	-0.267	3.74	
Person in 70 \$	-0.111	1.31	-0.127	1.56	
Single	Base category (omitted)		Base category (omitted)		
Married	0.407	10.49	0.414	10.91	
Living together	0.145	2.48	0.152	2.62	
Divorced	-0.228	4.28	-0.235	4.35	
Separated	-0.584	8.16	-0.588	8.17	
Widowed	-0.148	3.07	-0.152	3.11	
Number of children	0.005	0.41	0.009		0.75
Employed	Base category (omitted)		Base category (omitted)		
Unemployed	-0.848	10.64	-0.849	10.69	
Scandinavia	Base category (omitted)		Base category (omitted)		
Western Europe	-0.488	4.71	-0.484	4.68	
Eastern Europe	-1.011	4.76	-1.012	4.77	
America	-0.060	0.61	-0.061	0.62	
Asia	-1.556	11.48	-1.552	11.64	
Pacific	-0.374	2.17	-0.375	2.16	
Wave 1	Base category (omitted)		Base category (omitted)		
Wave 2	-0.004	0.04	0.001	0.01	
Wave 3	-0.034	0.35	-0.024	0.24	
Wave 4	0.106	0.88	0.112	0.93	
Growth rate	0.041	3.61	0.039		3.31
GDP per capita	-1.48*10 ⁻⁶	0.27	-1.15*10 ⁻⁶		0.21
Low income	Base category (omitted)		Base category (omitted)		
Lower middle income	0.330	7.52	0.174	3.02	
Upper middle income	0.566	9.57	0.408	5.80	
High income	0.786	12.80	0.638	7.82	
Inflation rate	-0.012	3.63			
*Low income			-0.017	Base cat.	4.68
*Lower middle income			-0.012	3.10	3.56
*Upper middle income			-0.008	3.91	2.38
*High income			-0.008	2.77	1.78

living together; negative and significant coefficients on being unemployed and on being divorced, separated or widowed; life satisfaction first decreasing then increasing in age (with turning point in the late 40s). In quantitative terms, large differences exist between being married and being divorced (about 0.62 on a 10-point scale) and between being (full-time) employed and being unemployed (0.85). The annual growth rate of GDP has a significant positive coefficient; per capita GDP is insignificant. The results on socio-demographic variables are available upon request.

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Unemployment rate	-0.032	2.85			
*Low income			-0.040	Base cat.	3.07
*Lower middle income			-0.028	1.89	2.34
*Upper middle income			-0.031	0.97	2.55
*High income			-0.032	0.82	2.63
Observations	91195		91195		
R ²	0.133		0.134		
Relative inflation aversion ^{c)}					
Average	0.307				
Low income			0.350		
Lower middle income			0.337		
Upper middle income			0.209		
High income			0.186		

Dependent variable: 10-point life satisfaction. Method: OLS. Robust t-values are corrected for clustering at the country-year level. Number of clusters: 77. a) With respect to the interaction terms, the t-values in this column test whether the coefficients for lower middle income, upper middle income and high income are statistically different from the coefficient for low income. b) With respect to the interaction terms, the t-values in this column test whether the coefficients for low income, lower middle income, upper middle income and high income are statistically different from zero. c) Relative inflation aversion is the coefficient on the inflation rate divided by the sum of the coefficients on the unemployment rate and (1/100) times the coefficient on being individually unemployed (see text). For example, relative inflation aversion for the category low income is $-0.017/(-0.040-0.00849) = 0.350$.

Regression 1 is the empirical counterpart to eq. (1) stated in subsection 3.2. In line with previous literature, life satisfaction is monotonically and significantly increasing with income. People in the “high income” class are 0.786 points more satisfied on the 10-point life satisfaction scale than are people in the “low income” class. To illustrate in terms of personal life events, this difference quantitatively corresponds to the effect of becoming unemployed, which is -0.848. Also in line with previous findings, the levels of inflation and unemployment affect life satisfaction negatively and statistically significantly. Since, as stated above, the rates of inflation and unemployment are measured in percent, the estimated coefficients measure the effects of an increase of inflation and unemployment, respectively, by 1 percentage point. A 1-percentage point increase in the inflation rate reduces life satisfaction of an average person by 0.012 points on the 10-point scale, whereas a 1-percentage point increase in the unemployment rate reduces life satisfaction by 0.032 points.⁸ To illustrate, the latter figure corresponds to about one twentieth of the effect of a divorce, which is 0.635 (difference of the coefficients on ‘married’ and ‘divorced’).

We use the coefficients on the inflation rate and the unemployment rate to compute a measure of relative inflation-unemployment aversion. To do so, we observe that a 1-percentage point increase in the unemployment rate shifts 1 percent of the people into unemployed status and account for this circumstance in computing relative inflation aversion. Specifically, following Di Tella et al. (2001), we add to the coefficient on the unemployment rate 1 percent of the coefficient on being unemployed (which is -0.848).⁹ The measure of relative inflation-unemployment aversion hence is 0.307 $(-0.012/(-0.032-0.00848))$. This figure for the OECD is in the range found in previous SWB studies using West-European and U.S. data (see Table 1).

⁸ An increase in inflation and unemployment by one standard deviation reduces life satisfaction by 0.192 and 0.128, respectively.

⁹ We checked whether the coefficient on being unemployed differs by income category and found no such difference at conventional levels of significance.

Regression 2 differentiates the relationships between life satisfaction and the rates of inflation and unemployment by income. It is seen that not just the average individual (as in regression 1) but people from all income classes are negatively and statistically significantly affected by both inflation and unemployment. The effect of inflation is monotonically decreasing in income. The effect sizes in all of the upper three income classes are significantly smaller than the effect in the bottom income class. In the top income class it is less than half as large as in the bottom class and only weakly significantly different from zero.

As to unemployment, its effect also tends to be smaller at higher income, but the income dependence is less pronounced quantitatively than it is in the case of inflation. The effect of unemployment on life satisfaction is about 75 percent as large in the upper three income classes (-0.028 to -0.032) as it is in the bottom income class (-0.040), but this difference is insignificant for the upper middle income and high income class and only weakly significant for the lower middle income class ($p = 0.059$).

Since the coefficients on inflation and unemployment are significantly different from zero in all income classes, it is meaningful to consider their ratios. As in the case of the average person (regression 1), we will take these ratios – adjusted for the coefficient on individual unemployed status – as an indicator of relative inflation-unemployment aversion. As shown at the bottom of Table 2, relative inflation-unemployment aversion is similar in the two bottom income classes (0.337 to 0.350), but considerably smaller in the top income class (0.186). Importantly, however, relative inflation-unemployment aversion is less than unity in all income classes.

It is instructive to compare the coefficients on income in regressions 1 and 2. While (as stated above) a person in the high income category is 0.786 points more satisfied than a person in the low income category according to regression 1, this difference reduces to 0.638 in regression 2. A considerable fraction of the well-being effect of higher income thus reflects high income individuals' smaller sensitivity to inflation.

In comparison with previous literature, we can state that, in line with what was found by Easterly and Fischer (2001) in a stated preference exercise, our experience-based approach suggests that absolute inflation aversion is decreasing in income. In contrast, however, to the stated preference results of Scheve (2004) and Jayadev (2006), not just absolute inflation aversion but also relative inflation aversion is less pronounced among the relatively well-off than among the less well-off. According to our results, relatively rich people are not only better off due to the direct life satisfaction effect of income, but also because they are less affected by inflation.

4.2 Macroeconomic Preferences by Income and Education Level

For 58 out of 77 country-year clusters we have data on people's education level ('some primary education', 'some secondary education', 'at least some university education' (tertiary education)). This allows us to study whether inflation and unemployment aversion vary not just with income but also with education (as did Easterly and Fischer 2001).

Table 3 in the end of this paper presents life satisfaction regressions based on this restricted sample, with education as an additional explanatory variable. Regression 3 is the analog to regression 1 in Table 2. It is seen that life satisfaction increases monotonically in income, with coefficients very similar to those in regression 1. Life satisfaction also increases in the education level, but the coefficient on 'some secondary education' is not significantly different from that on the omitted category 'some primary education' whereas the coefficient for 'at least some university education' (tertiary education) is weakly significantly greater ($p = 0.059$). The coefficient on inflation is approximately of the same magnitude as in regression 1, whereas the coefficient on the unemployment rate is now almost two thirds larger.

Regression 4 is the analog to regression 2 in Table 2. This regression confirms all of the qualitative findings from regression 2: Inflation aversion decreases monotonically and significantly in income whereas there is no significant variation of unemployment aversion by income.

Regression 5 differentiates inflation and unemployment aversion by education level instead of income. Whereas the base category in regression 4 consists of persons with low income, disregarding their education level, the base category in regression 5 consists of persons with only primary education, disregarding their income. It is seen that inflation aversion is significantly greater in people with secondary education and weakly significantly greater ($p = 0.055$) in people with university education than in people that have only primary education. Unemployment aversion, conversely, monotonically decreases in the education level, with a statistically significant difference between persons with university education and persons with primary education only.

In regression 6 we combine the differentiation by income with that by education. The reference group now consists of people with low income and only primary education. This regression confirms the results from regressions 4 and 5: Inflation aversion decreases with income and increases with the education level. Unemployment aversion is unaffected by income and decreases in the education level. This suggests that the dimensions income and education have independent effects on the aversion towards inflation and unemployment.

As to relative inflation aversion, its average value is somewhat smaller in regression 3 ($0.264 = (-0.014/-0.053)$) than in regression 1 (0.307), and is decreasing in income according to regression 4, as it is according to regression 2. As seen in regression 5, relative inflation aversion is substantially greater for people with secondary and university education than for people with primary education only. Regression 6, which includes interactions of inflation and unemployment with both income and education, confirms the results from regressions 4 and 5 that relative inflation aversion decreases in income and increases in the education level.

In spite of the income and education dependence of inflation and unemployment aversion, regressions (3) – (6) confirm that inflation aversion is less than unemployment aversion at all levels of income and education.

4.3 Robustness Checks

The stated-preference studies discussed in section 2 included age, being unemployed, and being female as controls in order to check whether it is in fact income, rather than other factors, which affects inflation aversion. We conducted similar robustness checks by including interactions of the rates of inflation and unemployment with those three attributes in addition to the interaction with income. These regressions are based on the large sample with 77 country-year clusters.¹⁰

Regression 7 in Table 4 in the end of this paper focuses on income and age. The base category consists of persons with low income under the age of 20. It is seen that, relative to this base group, inflation aversion decreases in income and becomes insignificant for people from the top two income groups. With respect to age dependence, we see that people in their 30s, 40s and 60s are significantly more inflation averse than the other age groups.

In contrast to inflation aversion, unemployment aversion is insignificant for the base group, and it remains to be so at higher income levels. With increasing age (instead of increasing income), unemployment aversion is significant for people in their 40s and older. Whereas inflation aversion is

¹⁰ Since these regressions do not include education, we re-estimated them on the restricted sample, including the education levels as additional explanatory variables and found the coefficients of interest to be rather unaffected by the inclusion or omission of the education levels. The results are available upon request.

highly dependent on income, unemployment aversion is highly dependent on age. This probably reflects the relatively poor employment prospects of older persons if made redundant.

Regression 8 focuses on income and a person's actual employment status. The base category consists of persons with low income who are not unemployed. It is seen that the interactions of the inflation rate and the unemployment rate with 'unemployed' are both insignificant (the t-values being 0.02 and 0.19, respectively). Hence, neither inflation aversion nor unemployment aversion are affected by being unemployed. The aversion towards the phenomenon of general unemployment is thus the same, no matter whether it reflects the fear of getting laid off (if employed) or the fear of not finding a job (if unemployed). The results concerning the income dependence of inflation and unemployment aversion from regression 2 are preserved.

Regression 9 examines the income dependence jointly with the dependence on sex. The base category consists of men with low income. Since the coefficient on the inflation-female interaction (-0.014) is negative and significantly different from the base category (male), inflation aversion is more pronounced in women than in men. Since the coefficient on the unemployment-female interaction (-0.044) is insignificantly different from the base category, unemployment aversion does not vary significantly with sex. Results on income dependence are as in regression 2.

Regression 10 investigates the income dependence, the age dependence, the dependence on the employment status, and the dependence on sex jointly. The base category consists of men under the age of 20 with low income who are not unemployed. The results of this combined exercise are qualitatively the same as in regressions 7 through 9.

The overall message from these checks is that the basic results from regression 2 are robust to the inclusion of age, unemployed status, and sex: Inflation aversion is decreasing in income whereas unemployment aversion displays no systematic income dependence. However, unemployment aversion strongly increases in age.

In addition to the robustness with respect to including additional control variables, we checked the robustness with respect to the estimation method and the coding of the income groups. Estimating the counterpart to regression 2 by means of an ordered Probit maximum likelihood estimator instead of least squares confirms that both absolute and relative inflation aversion decrease with income, whereas no systematic variation of unemployment aversion with income can be found. This also holds when we use dummy variables for 10 instead of four income categories and when we code income as an integer-valued numerical variable that runs from 1 to 10. These checks also confirm that relative inflation-unemployment aversion is less than unity at all levels of income.

4.4 Discussion

Our analysis has shown that the dominance of unemployment aversion over inflation aversion found in previous well-being studies for Western Europe and the U.S. (Di Tella et al. 2001, 2003; Wolfers 2003, Welsch 2011) extends to the set of almost all OECD member states, including countries as diverse as, e.g., Mexico and Japan. Quantitatively, the inflation-unemployment trade-off is in the range found in those previous studies. In addition, and importantly, we found that the dominance of unemployment aversion over inflation aversion exists at all levels of income and education, though at varying degrees.

Regarding the dependence of macroeconomic preferences on income and education, Table 5 below offers a summary of our main qualitative findings in comparison with earlier literature. With respect to inflation aversion, we found that it decreases with income but increases with the education level. Referring to the mechanisms discussed in section 2, this may reflect that less wealthy individuals are more affected by increases in the cost of living than are richer persons. In this vein, Easterly and Fischer (2001) found that high inflation tends to lower the real wages of the poor. This

seems to be more important than any effect through non-indexed progressivity of the tax system that may affect the non-poor. The increase of inflation aversion with the education level may reflect a better understanding of the taxation-related effects of inflation or of the more indirect effects on the economy overall. In sum, income and education seem to affect inflation aversion through different channels, which leads to opposite signs of inflation aversion's dependence on these two factors.

Table 5. Summary of main findings

	This study			Easterly and Fischer (2001)	Scheve (2004)	Jayadev (2006)
	Absolute inflation aversion	Absolute unemployment aversion	Relative inflation aversion	Absolute inflation aversion	Relative inflation aversion	Relative inflation aversion
Income	-	0	-	-	+	+
Education	+	-	+	-	0	+

Note: A plus (minus) sign indicates a significant positive (negative) relationship. Zero (0) indicates lack of a significant relationship.

In contrast to inflation aversion, we found no dependence of unemployment aversion on income, but a decrease with the level of education. The former makes sense since there are few reasons to expect that the income level (*per se*) affects the risk of joblessness. In addition, richer individuals will be at least as much affected by higher taxes to pay unemployment benefits when unemployment rates are high as are poorer persons. As to the role of education, a high rate of unemployment may spur the (perceived) risk of losing their jobs especially among the less well educated.

In relation to previous literature, some of our results are in agreement with earlier findings while others differ. The decrease of absolute inflation aversion with income is in line with Easterly and Fischer (2001). By contrast, our finding that relative inflation-unemployment aversion also decreases with income is opposite to what was found by Scheve (2004) and Jayadev (2006). As discussed above, however, there are good reasons for why (absolute) inflation aversion decreases with income while (absolute) unemployment aversion may be income-independent, implying a negative relationship between relative inflation aversion and income.

In trying to understand the reasons for the divergence of results, it should be recalled that the studies of Scheve (2004) and Jayadev (2006) are based on a stated-preference methodology, which elicits people's opinion on inflation relative to unemployment from explicit survey questions. Those opinions may reflect the various effects of inflation to different degrees. While they probably capture inflation's direct effects on people's well-being through the cost of living, it is unclear whether they adequately reflect the sophisticated general economic effects of inflation. Assessment of these latter effects involves rather complicated cognitive processes, and these processes may be subject to several sorts of biases (Kahneman and Sugden 2005). In addition, opinions as to whether inflation or unemployment is more detrimental (relative inflation aversion) may be related to ideological preferences.

In comparison with the stated-preference approach, the experience-based approach to preference elicitation is cognitively less demanding. In particular, it does not require that people are consciously aware of complex cause-effect relationships. In addition, it does not rely on ideas of the effects of inflation (relative to unemployment) that are subject to ideology: All that matters for the experience-based approach is the statistical association between subjective well-being and the rates of inflation

and unemployment. This correlation captures all channels through which inflation affects well-being, whether cognitive or other.

While we view the experience-based approach to studying social preferences as a promising addition to the methodological toolbox, a few caveats should be kept in mind. First, as always in empirical work, it is important to check whether effects attributed to one variable might not in fact be biased by the omission of correlated variables. In the current case, we checked the robustness of the income dependence of inflation aversion by including those controls that have also been considered in stated-preference studies (education level, age, unemployed status, and being female) and found our qualitative results robust to these checks.

Second, and more specific to this approach, subjective well-being data need to satisfy conventional quality standards of internal consistency, reliability, and validity in order to be useful for statistical work. These properties of the data are supported by an extensive validation literature (for a review see, e.g., Frey and Stutzer 2002). As to the issue of cardinality of the data, our robustness check of using ordered Probit instead of least squares showed that assuming ordinality or cardinality of well-being scores has little effect on empirical results (for a more general assessment see Ferrer-i-Carbonell and Frijters, 2004).

5. Conclusions

Studies of the macroeconomic correlates of subjective well-being have produced robust evidence that both inflation and unemployment have negative impacts on people's well-being, but have not studied the incidence of those impacts according to people's income and education level, or, more generally, their socio-economic status. Studies on people's stated attitudes towards inflation and unemployment, on the other hand, found that the poor are more likely than the non-poor to mention inflation as a top national concern (they are more absolutely inflation averse), but that they are less likely than the non-poor to prefer that inflation be controlled rather than unemployment (they are less relatively inflation averse).

This paper has used subjective well-being data of more than 91,000 individuals from the World Values Surveys to study whether previous findings in West-European and U.S. data on the well-being effects of inflation and unemployment (and hence the implicit aversion towards inflation and unemployment) extend to the almost complete set of OECD countries and how those effects vary with income and education. While absolute inflation aversion decreases with income, it increases with the education level. Absolute unemployment aversion, conversely, does not vary systematically with income, but decreases with the education level. The differing results concerning the roles of income and education suggest that different dimensions of being disadvantaged influence the well-being effects of inflation and unemployment in different ways. In particular, being poor makes people more vulnerable to inflation due to inflation's effect on their cost of living. Being less educated, on the other hand, may spur the risk of unemployment when the national rate of unemployment is high.

In spite of the poor being more inflation averse than the rich, aversion towards inflation is smaller than aversion towards unemployment at all levels of income and education. In this sense, this study confirms the social benefit of anti-unemployment policy beyond Western Europe and the U.S. and establishes its independence of issues of social incidence.

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Table 3. Estimation results with education level included (restricted sample, Observations = 66,699)

	<i>Regression 3</i>		<i>Regression 4</i>			<i>Regression 5</i>			<i>Regression 6</i>		
	<i>coefficient</i>	<i>t-value</i>	<i>coefficient</i>	<i>t-value</i> (different from base category)	<i>t-value</i> (different from zero)	<i>Coefficient</i>	<i>t-value</i> (different from base category)	<i>t-value</i> (different from zero)	<i>coefficient</i>	<i>t-value</i> (different from base category)	<i>t-value</i> (different from zero)
Low income	Base category (omitted)		Base category (omitted)			Base category (omitted)			Base category (omitted)		
Lower middle income	0.302	5.62	0.143	2.31		0.307	5.50		0.162	2.66	
Upper middle income	0.553	7.42	0.385	4.29		0.556	7.25		0.430	5.01	
High income	0.780	9.98	0.660	6.75		0.783	9.91		0.728	7.67	
Primary education	Base category (omitted)		Base category (omitted)			Base category (omitted)			Base category (omitted)		
Secondary education	0.063	1.25	0.051	0.97		-0.047	0.50		-0.042	0.47	
Tertiary education	0.108	1.89	0.096	1.58		-0.072	0.74		-0.068	0.77	
Inflation rate	-0.014	4.24									
*Low income			-0.019	Base cat.	5.39				-0.017	Base cat.	4.61
*Lower middle income			-0.014	3.78	4.11				-0.010	4.45	2.77
*Upper middle income			-0.010	3.95	3.11				-0.005	4.47	1.23
*High income			-0.009	2.58	1.99				-0.003	3.35	0.49
*Primary education						-0.012	Base cat.	3.41	-0.017	Base cat.	4.61
*Secondary education						-0.017	3.74	4.74	-0.024	6.15	6.69
*Tertiary education						-0.014	1.96	4.09	-0.025	4.70	6.04
Unemployment	-0.053	3.93									
*Low income			-0.059	Base cat.	3.77				-0.069	Base cat.	4.10

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*Lower middle income			-0.048	1.45	3.47				-0.062	1.02	4.24
*Upper middle income			-0.050	0.74	3.30				-0.068	0.08	4.70
*High income			-0.056	0.25	4.13				-0.078	0.77	5.83
*Primary education						-0.066	Base cat.	4.49	-0.069	Base cat.	4.10
*Secondary education						-0.047	1.53	2.94	-0.048	1.82	2.69
*Tertiary education						-0.039	2.16	2.93	-0.037	2.88	2.33
R ²	0.151			0.152			0.152			0.153	

Dependent variable: 10-point life satisfaction. Method: OLS. Regressions include personal characteristics (age, age-squared, sex, civil status, number of children, unemployed status), macro controls (GDP growth, GDP per capita), wave dummies and region dummies. Robust t-values are corrected for clustering at the country-year level. Number of clusters: 58. Primary education = 'some primary education'; Secondary education = 'some secondary education'; Tertiary education = 'at least some university education'.

The base categories for interaction terms are as follows: persons with low income (regression 4); persons with some primary education (regression 5); persons with low income and some primary education (regression 6). With respect to the interaction terms, the t-values in the column titled "t-value (different from base category)" test whether the coefficients are statistically different from the coefficient for the respective base category.

Table 4. Robustness to control variables (full sample, Observations = 91,195)

	<i>Regression 7: Age</i>			<i>Regression 8: Unemployed</i>			<i>Regression 9: Female</i>			<i>Regression 10: All variables</i>		
	<i>coefficient</i>	<i>t-value (different from base category)</i>	<i>t-value (different from zero)</i>	<i>coefficient</i>	<i>t-value (different from base category)</i>	<i>t-value (different from zero)</i>	<i>coefficient</i>	<i>t-value (different from base category)</i>	<i>t-value (different from zero)</i>	<i>coefficient</i>	<i>t-value (different from base category)</i>	<i>t-value (different from zero)</i>
Low income	Base category (omitted)			Base category (omitted)			Base category (omitted)			Base category (omitted)		
Lower middle income	0.232	3.98		0.174	3.08		0.176	3.07		0.237	4.22	
Upper middle income	0.497	7.01		0.401	5.77		0.410	5.80		0.504	6.98	
High income	0.742	8.69		0.636	7.86		0.641	7.84		0.753	8.78	
Inflation rate												
*Low income	-0.014	Base cat.	3.56	-0.017	Base cat.	4.79	-0.020	Base cat.	4.66	-0.017	Base cat.	3.79
*Lower middle income	-0.009	2.93	2.51	-0.012	3.47	3.53	-0.016	3.03	4.20	-0.012	3.14	3.11

*Upper middle income	-0.005	3.68	1.41	-0.008	4.17	2.37	-0.012	3.65	3.30	-0.008	3.62	2.27
*High income	-0.004	2.68	1.09	-0.008	2.84	1.78	-0.011	2.64	2.73	-0.007	2.63	2.03
*Person in 10's	-0.014	Base cat.	3.56							-0.017	Base cat.	3.79
*Person in 20's	-0.015	0.88	4.36							-0.019	1.23	4.89
*Person in 30's	-0.020	5.59	4.76							-0.023	5.01	4.76
*Person in 40's	-0.019	4.36	4.86							-0.022	4.07	4.91
*Person in 50's	-0.014	0.32	3.22							-0.018	0.32	3.39
*Person in 60's	-0.019	1.95	4.87							-0.022	1.79	5.34
*Person in 70's	-0.016	0.50	3.39							-0.019	0.39	4.35
*Employed				-0.017	Base cat.	4.79				-0.017	Base cat.	3.79
*Unemployed				-0.017	0.02	2.81				-0.016	0.24	2.46
*Male							-0.020	Base cat.	4.66	-0.017	Base cat.	3.79
*Female							-0.014	2.53	4.07	-0.010	2.66	2.88
Unemployment rate												
*Low income	-0.001	Base cat.	0.01	-0.041	Base cat.	3.14	-0.037	Base cat.	2.72	0.005	Base cat.	0.32
*Lower middle income	0.003	0.60	0.22	-0.028	1.93	2.36	-0.025	1.85	1.98	0.008	0.48	0.62
*Upper middle income	-0.005	0.37	0.35	-0.031	0.98	2.60	-0.028	0.93	2.28	-0.000	0.48	0.01
*High income	-0.007	0.56	0.54	-0.032	0.84	2.64	-0.029	0.76	2.36	-0.003	0.70	0.23
*Person in 10's	-0.001	Base cat.	0.01							0.005	Base cat.	0.32
*Person in 20's	-0.012	1.01	0.84							-0.006	1.04	0.45
*Person in 30's	-0.021	2.11	1.63							-0.016	2.17	1.17
*Person in 40's	-0.028	2.64	1.90							-0.023	2.66	1.48
*Person in 50's	-0.035	3.13	2.29							-0.030	3.17	1.89
*Person in 60's	-0.058	4.32	4.02							-0.054	4.43	3.57
*Person in 70's	-0.068	5.46	4.09							-0.064	5.23	3.84
*Employed				-0.041	Base cat.	3.14				0.005	Base cat.	0.32
*Unemployed				-0.038	0.19	1.90				-0.006	0.73	0.29
*Male							-0.037	Base cat.	2.72	0.005	Base cat.	0.32
*Female							-0.044	1.50	3.28	-0.003	1.50	0.17
R ²	0.135			0.133			0.134			0.135		

Dependent variable: 10-point life satisfaction.

Method: OLS. Regressions include personal characteristics, macro controls, wave dummies and region dummies.

The base categories are as follows: persons with low income below the age of 20 (regression 7), persons with low income who are not unemployed (regression 8), men with low income (regression 9), men with low income below the age of 20 who are not unemployed (regression 10). With respect to the interaction terms, the t-values in the column titled "t-value (different from base category)" test whether the coefficients are statistically different from the coefficient for the respective base category.