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Money Illusion Under Test*

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Abstract

Much progress has been made in recent years in developing and applying a direct measure of utility using survey questions on satisfaction with income and with life in general. In this paper we apply this new type of measurement to the study of money illusion. Using data from the German Socio-Economic Panel for the years 1993 to 2003, we cannot reject the hypothesis of no money illusion.

JEL Classification: I31, D12
Keywords: cost-of-living, subjective well-being, fixed effects

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1 Introduction

This paper proposes a novel test for the existence of money illusion. It is based on people's self-reported satisfaction with their income, as elicited in large household panel surveys. In the absence of money illusion, reported income satisfaction should be unchanged if commodity prices and nominal income increase (or decrease) by the same proportion. In other words, satisfaction depends on real rather than on nominal income. If, by contrast, a proportional increase in prices and nominal income increases subjective well-being, then we have evidence for money illusion. This proposition can be tested.

Formally, suppose that an indirect utility function $v(y, p)$ can be approximated by

$$v(y, p) \approx \beta_0 + \beta_1 \ln y + \beta_2 \ln p \tag{1}$$

where y is nominal income and p is an appropriately defined price level. Then, the absence of money illusion means that $\beta_1 = -\beta_2$. In order to test this restriction, we follow the recent literature in empirical welfare economics (Frey and Stutzer, 2001, van Praag and Ferrer-i-Carbonell, 2004) and take survey responses to a question such as "How satisfied are you with your income at present" (on a scale from 0 to 10) as a proxy for $v(y, p)$. An ordinary least squares (OLS) regression of v on individual logarithmic income and the relevant logarithmic price level yields unbiased estimators of β_1 and β_2 only if $\ln y$ and $\ln p$ are uncorrelated with the approximation error. With panel data, an improved estimator can be based on a fixed effects specification.

We provide such estimates using data from a large, representative household panel survey, the German Socio-Economic Panel (GSOEP), for the years 1993 to 2003, incorporating information on income, satisfaction with household income, and regional cost of living indices provided by Roos (2004). Satisfaction with household income serves as a proxy for individual utility in order to assess money illusion, which is a new approach. The results show that people's satisfaction with their financial situation indeed responds to changes in the relevant price level – as postulated by standard economic theory. Moreover, the hypothesis of no money illusion cannot be rejected.

2 Background

The term money illusion was coined by J.M. Keynes in the early twentieth century and has gained a lot of interest since, e.g., in an entire book by I. Fisher (1928). Money illusion provided a basis for explaining involuntary unemployment and cyclical developments in the economy, but direct empirical evidence did not exist. In the 1970s, it became unfashionable to build models around money illusion, because it was not in line with the prevailing theory of utility-maximizing decisions that should be based on real rather than nominal quantities.[1]

In the wake of the emergence of behavioral economics the topic has attracted renewed attention lately. Money illusion counts among one of the many potential "anomalies" in human decision-making. Whether it exists or not is an empirical matter, and Shafir et al. (1997) and Fehr and Tyran (2001) are among the recent contributions in this field. Fehr and Tyran (2001) conclude, from experimental evidence, that there is only "a small amount of money illusion at the individual level, as expected, but beyond that there is no individual irrationality" (p. 1251). In contrast, Shafir et al. (1997) find ample evidence for money illusion from surveys where participants had to evaluate different (hypothetical) income and price scenarios. In addition, they found that framing matters: "[...] when the emphasis is not purely economic, however, the attribution of well-being is driven primarily by a nominal rather than a real evaluation." (p. 352).

In our view, the question whether and to what extent money illusion at the individual level is empirically relevant is not yet settled, and therefore warrants further investigation. We approach the issue with a methodology that is completely different from – and in some respects superior to – that of previous studies. We use evidence from a large, representative household survey rather than an experimental student population. We avoid hypothetical questions and framing effects. The information we use refers to the real current situation of the respondent, and it has been collected – from the respondent's point of view – in a context totally unrelated to the issue of nominal versus real assessment.

[1] James Tobin (1972, p. 3) characterized the situation in the following way: "an economic theorist can, of course commit no greater crime than to assume money illusion."

3 Data and Methods

Our primary data source is the GSOEP, a large representative longitudinal study of private households in Germany. The GSOEP surveys the same households annually since 1984. In 1990, it was expanded to include households from the former German Democratic Republic. As the GSOEP does not contain information about regional prices, another source is consulted. Roos (2004) calculates a cross-sectional cost of living index for the federal states of Germany in 1993 and extrapolates it over time using information on regional inflation rates. Since the available cost of living series only starts in 1993, we use the period 1993 to 2003 as our observation span.

The regression equation can be written as

$$v^*_{ijt} = \beta_0 + \beta_1 \ln y_{ijt} + \beta_2 \ln p_{jt} + \beta_3 \ln n_{ijt} + \delta_t + \theta_j + \varepsilon_{ijt} \tag{2}$$

where $j = 1, \ldots, 12$ indexes federal states, and $t = 1993, \ldots, 2003$ indexes survey years. The observed outcome v_{ijt} is the response to the financial satisfaction question, measured on an eleven point response scale. We are well aware that this satisfaction measure is, strictly speaking, discrete and ordinal. However, we disregard this aspect for simplicity and treat the survey responses as cardinal. Past research has shown that it makes virtually no difference whether one uses linear models or non-linear ordered response models in applications with subjective well-being data (Ferrer-i-Carbonell and Frijters, 2004).

The model postulates that individual satisfaction with income is a function of nominal income, price level, household size, all in logs, as well as time (δ_t) and regional (θ_j) fixed effects. The control for regional fixed effects is particularly important, as regions with attractive local amenities will also tend to have high cost of living.

Ideally, we would like to measure prices at the individual level, i.e., for a basket of goods that is typically consumed by that household. However, such a price index is not available, and the next best alternative is to use regional cost of living indices p_{jt}. Such indices are available for 13 out of the 16 states (Roos, 2004).[2] Moreover, there is no separate coding in the GSOEP for the

[2] Bremen, Hamburg and Schleswig-Holstein do not report inflation rates.

federal states Rhineland-Palatinate and Saarland, so that the cost of living index for these two states had to be combined, leaving us with 132 distinct price observations (12 regional indices over 11 years). There is substantial variation in regional prices. The difference in the 1993 cost-of-living index between the most expensive state (Hessen) and the least expensive state (Sachsen-Anhalt) amounts to 23.4 percent. The average annual growth rates range from a low of 1.1 percent in Berlin to a high of 1.9 percent in Sachsen-Anhalt.

Income is measured as current monthly household net income.[3] Rather than using a pre-defined equivalence scale, we include the log of the household size n_{ijt} as an additional regressor. Economies of scale exist as long as $|\beta_3| < \beta_1$.

The data form an unbalanced panel. After restricting the sample to those aged 25 to 64, there is a total of 116,169 observations on 23,073 distinct persons. In principle, the panel dimension can be incorporated in the estimation procedure in a number of ways. At a minimum, the standard errors should be corrected to account for clustering at the individual level. As was shown in previous research, individual effects are pivotal in modeling subjective well-being (Ferrer-i-Carbonell and Frijters, 2004), and the model can be estimated alternatively conditional on fixed effects (using the within estimator) or by generalized least squares, treating the individual specific error component as random. A Hausman test always rejects the random effects specification, and we therefore only report the within estimates.

4 Results

Table 1 presents three sets of regression results. The simple OLS estimates of model (2) without fixed effects are shown in the first column. The second column shows the results with fixed effects. In the third column, the fixed effects model is extended by additional regressors.

The estimated income and size effects for the simple OLS model are similar to those found in

[3] This is total monthly income of all household members, after the deduction of tax and social security contributions, and including regular transfer payments such as rent subsidy, child benefit, government grants, and subsistence allowances.

the previous literature (e.g., van Praag and Ferrer-i-Carbonell, 2004). For example, a ten percent increase in income is predicted to lead to a movement up by 0.2 points on the 0-10 response scale. Keeping income constant, satisfaction with income is a decreasing function of household size.

What is puzzling, though, is a positive price level effect. This spurious effect arises since the model ignores an important determinant of satisfaction. It is well documented that East Germans report substantially lower satisfaction levels than West Germans in all satisfaction domains, including income satisfaction. At the same time, the costs of living are much lower in the East than in the West.

To account for this effect, we include a set of regional dummy variables, in addition to fixed time and individual specific effects.[4] The price effect now turns negative, i.e., a higher price level is associated with lower income satisfaction. The effect is statistically significant at the 10 percent level. The point estimate (-2.007) is even larger in absolute value than the income effect (+1.558). Such a result would be consistent with other evidence that people in Germany actually overestimate the inflation during and following the introduction of the Euro in January 2002 (Brachinger, 2005). However, a formal test of the hypothesis that $\beta_1 = -\beta_2$ cannot be rejected (p-value = 0.687). So the two coefficients are not statistically significantly different from each other, and therefore, we do not find evidence for money illusion.

This conclusion is confirmed in an extended specification, where we additionally include a second order polynomial in age and two indicator variables for self-reported good health and unemployment. These are important variables in life satisfaction models (Frey and Stutzer, 2001). Their inclusion in a model for income satisfaction is maybe less obvious. In fact, health (positive) and unemployment (negative) are found to be important explanatory factors in financial satisfaction. Either the answers in the various satisfaction domains are interdependent, or health and unemployment have indeed direct effects on financial satisfaction. For example, the expenditures associated with bad health may reduce income satisfaction for a given income. Similarly, a given income may lead to lower satisfaction when it comes from government transfers in the case of unemployment

[4]Regional effects can be identified separately from individual fixed effects since people move between regions.

Table 1: Regression Results for Satisfaction with Income (N=116,169)

	(1)	(2)	(3)
Log income	2.119**	1.558**	1.438**
	(0.023)	(0.019)	(0.020)
Log price	1.515**	-2.007†	-2.194*
	(0.121)	(1.118)	(1.097)
Log household size	-0.741**	-0.517**	-0.461**
	(0.025)	(0.025)	(0.026)
Age squared $\times 10^{-1}$			0.001
			(0.001)
Good health			0.603**
			(0.013)
Unemployed			-0.798**
			(0.021)
Fixed effects[1]	No	Yes	Yes
p-value ($\beta_1 = -\beta_2$)		0.6874	0.4900

Source: German Socio-Economic Panel 1993-2003.
Notes: Standard errors in parentheses. Coefficients marked with ** (*/†) are significant at the 1% (5%/10%) significance level.
[1] Time, regional and individual effects

rather than own earnings. Whatever the explanation, the effect of this alternative specification on the estimated income and price coefficients is minimal, and we find again, that the hypothesis of no money illusion cannot be rejected.

5 Conclusions

The primary objective of this paper was to investigate the phenomenon of money illusion at the individual level, using GSOEP data drawn from the survey years 1993 to 2003. Satisfaction with household income serves as a proxy for individual utility in order to test for money illusion. The results do not support the presence of money illusion. In two models with fixed effects, the null hypothesis that the sum of the coefficient of logarithmic nominal income and the coeffcient of the logarithmic price index is 0 cannot be rejected at any conventional significance levels. We are

aware that not rejecting a null-hypothesis is not the same as proving it. But the evidence is at least compatible with the notion that a proportional increase of nominal income and of prices leaves the income satisfaction of people unaffected.

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