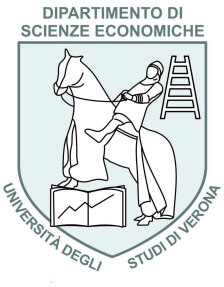

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Searching for Money Illusion in Europe

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Searching for Money Illusion in Europe

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Abstract:

We apply recent money illusion tests on data on individual life satisfaction from the Eurobarometer for the period 1980–2003. The null hypothesis of no money illusion cannot be rejected. Different nominal rigidities across European countries and EMU countries, specifically, cannot be explained by different degrees of money illusion.

Key words: cost of living; subjective well-being; price index; money illusion.

JEL Classification: I31, D12, D60, C23, D31

1. Introduction

Money illusion can be defined as "a tendency to think in terms of nominal rather than real monetary values. [...] We thus interpret money illusion as a bias in the assessment of the real value of economic transactions, induced by a nominal evaluation. Reliance on a nominal evaluation is not strategic or motivational in nature. Rather, it is due to the ease, universality, and salience of the nominal representation. The strength and persistence of this bias is likely to depend on several factors, notably the relative salience of the nominal and real representations, and the sophistication and experience of the decision maker." (Shafir *et al.* 1997, 341 and 348)

A different strand of literature interprets money illusion as the result of a numerousness effect, whereby people sometimes judge quantity on the basis of the number of units into which a stimulus is divided without fully considering other important variables (Pelham *et al.*, 1994; Wertenbroch *et al.*, 2007 and the literature quoted therein).

The concept of money illusion enjoyed mixed fortunes during the development of economic thought. Fisher (1928) is a classic book on the issue. However, Friedman (1968) prominently rejected the existence of money illusion as rational economic agents can only be interested in real economic magnitudes. James Tobin even wrote: "an economic theorist can of course commit no greater crime than to assume money illusion" (Tobin, 1972, p. 3).

However, money illusion came recently back to the fore as interest grew among economists regarding psychological constraints to agents' economic choices - see for instance the literature quoted in either Fehr and Tyran (2001, 2007), proposing an experimental approach to the issue, or Cannon and Cipriani (2006), which assessed its empirical relevance by exploiting a dataset on church collection during the Euro change-over in Italy and Ireland.

The nature of our work is empirical. Specifically we build on Boes *et al.* (2007) and on Deckers *et al.* (2013). Instead of studying an experimental student population we focus on the Eurobarometer household survey. This approach, therefore, avoids hypothetical questions and framing effects. We can instead refer to the respondent's perception of her real situation, while avoiding to explore data deriving from ad hoc analyses of the relative assessment of real and nominal economic magnitudes.

Our tests exploit data on life satisfaction, which, in absence of money illusion, should not depend on nominal income but on real income only. Therefore, when the price level and nominal income increase by the same proportion, life satisfaction should not be affected.

Formally, after Boes *et al.* (2007), it is possible to model the indirect utility function v(y, p), measured by life-satisfaction, as follows:

$$v(y_{it},p_{it})=\beta_1 y_{it}+ \beta_2 p_{it}+ \gamma'\mathbf{x}_{it}+e_{it} \quad (1)$$

where y_{it} is the log of nominal income, p_{it} the log of a price index, β_1 and β_2 coefficients to be estimated, $\mathbf{x_{it}}$ a vector of customary control variables in life satisfaction regressions, γ a vector of coefficients, e_{it} a stochastic error, and i and t are a country and a time index respectively. In this model, checking for money illusion implies running a test for the equality $\beta_1=-\beta_2$.

Deckers *et al.* (2013), instead, find that life satisfaction is a convex function of nominal income and insert, as further regressor, the differential between real and nominal income. In this context, a test for money illusion can be run within the following model

$$v(y_{it},dy_{it})=\delta_1 y_{it}+ \delta_2 dy_{it}+ \phi'\mathbf{x}_{it}+u_{it} \quad (2)$$

where dy_{it} is the difference between the log of real and nominal incomes, δ_1 and δ_2 coefficients to be estimated, ϕ a vector of coefficients, u_{it} a stochastic error. In this further context, checking for money illusion implies running a test for the equality $\delta_1=\delta_2$. Note that the logarithmic specification warrants convexity in (2).

Both Boes *et al.* (2007) and Deckers *et al.* (2013) focus on German regions. This has the advantage of considering price developments closer to those affecting single individuals. Though, national statistical offices customarily consider the same basket of goods throughout a country with the same set of weights. However, being Germany part of a monetary union, it is troublesome to draw inferences for monetary policy from the above studies. For this reason, in what follows we particularly focus on the EMU member states covered by the Eurobarometer survey, without neglecting, though, further Western European countries comprised in this same survey. We use the consumer price index. Therefore, to the extent that different national statistical offices use different commodity baskets with different weights in an effort to better represent their population of reference, our price index can be considered as closer to individual ones along a different dimension than that considered by Boes *et al.* (2007) and Deckers *et al.* (2013).

The rest of this work is structured as follows. First, we illustrate our data and methods. Next we move to our results and, finally, we conclude.

2. Data and methods

Data are from the Eurobarometer Survey Series; this is a repeated cross-section survey in which a random sample of Europeans is asked a variety of demographic and socio-economic questions, including one on life satisfaction. On average, the interviews are conducted twice a year and each survey consists of approximately 1,000 face-to-face interviews per country. The time of these interview is between March and October each year. The main question of interest is: “On the whole, are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?” Answers to the question can be split into four categories. In this paper, we use samples of individuals living in eighteen European countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, the United Kingdom, Switzerland and Iceland. The sample includes 411,350 individuals interviewed between 1980 and 2003. Since we are interested in studying the effect of nominal and real income on SWB (subjective well-being) of individuals we drop the later waves of the Eurobarometer surveys since personal income is not reported after 2003. Respondents are asked to report their household income, more specifically they are asked: “Here is an income scale; we would like to know in what group your family is, counting all wages, salaries, children allowances, pensions and any other income that comes in.” Answers are given by income band defined in terms of the currency of the country at the time. The bands are for income per month except that in some surveys, the bands are for income

per year for Denmark. The lowest and highest income bands are open-ended. The figure coded is income per month (the figures for Denmark being divided by 12 where necessary). Income is taken to be the midpoint of the band. The lowest band is assumed to be closed at 0 and the highest band is assumed to be twice the width of the preceding band.

Every regression includes a set of individual characteristics typically used in the literature: age, age-squared, dummy variables indicating gender, marital status (married, single, divorced or separated, widowed), household size, educational attainment (i.e., age-left-school dummies), work status (employed, self-employed, unemployed), and whether retired, keeping house or a student. We also include a set of countries and years fixed effects.

Finally following Montagnoli and Moro (2014), the dataset comprises a set of macroeconomic variables typically used to control for time-varying country effects and, in general, business cycle fluctuations. Data for GDP, inflation and unemployment are from the World Bank's World Development Indicators (WDI). These data provide annual, PPP-adjusted per capita GDP figures. The PPP adjustments are based on the 2005 round of the International Comparisons Project, and all of our estimates are in 2005 international US dollars.[1] For p_{it} we use data for the CPI, obtained from the OECD statistical website.

Table 1 presents a snapshot of the key variables.

From a methodological point of view, we implement linear probability models as suggested by Ferrer-i-Carbonell and Frijters (2004), and more generally, by Angrist and Pischke (2008). We make use of the two-way approach by Cameron *et al.* (2011) to compute the standard errors; this allows us to account for correlation within country and year levels.

[TABLE 1 ABOUT HERE]

3. **Results**

Table 2 presents the estimates of equations (1) and (2).

Results are presented for both the subgroup of countries adhering to the European single currency and for all the countries in our sample. The coefficients of the logs of income and CPI are of the expected sign and are statistically different from zero at conventional levels of significance in all the specifications.

[1] When the WDI data are missing, we supplement them with data from the Penn World Tables and from the IMF World Economic Outlook.

For completeness we also split the sample on before and after the introduction of the Euro. With the exception of the log of CPI, which loses significance, the estimates are very similar to those for the whole sample suggesting that the results are robust across time and space. [2]

The test for the equality (β_1=-β_2) presented in the last row cannot be rejected, suggesting that we cannot accept the hypothesis of money illusion in Europe.[3] Note that upon imposing this equality on the "After EURO" sample we obtained a 1% statistically significant coefficient equal to 0.16, very similar to those presented in the first, second and third columns. The size of our estimates is not strictly comparable with the results by Boes *et al.* (2007). This is because our dependent variable builds on a survey question about life satisfaction in general, while that of Boes *et al.* (2007) regards income satisfaction. Therefore, we also need to specify a different model than theirs. In order to provide further robustness to our results, the last two columns in Table 2 shows the tests for money illusion proposed by Deckers *et al.* (2013). The log of income is still statistically significant and so is the income differential (i.e. the difference between the log of real income and the log of income). The two estimates are not statistically different from each other (p-value=0.370), providing further evidence that money illusion can be rejected both when considering EMU countries and all the countries in our sample.

[TABLE 2 ABOUT HERE]

4. Conclusions

In the present work, we carried out money illusion tests for a number of European countries exploiting Eurobarometer data on life satisfaction. The null of absence of money illusion could never be rejected.

According to this evidence, different degrees of money illusion cannot be the origin of different degrees of nominal rigidities across European countries and EMU countries particularly - at least during the period of our observation. Hence, their source is more likely to reside in features of national markets for the final product and production inputs. This implies that reform efforts should

[2] The robustness of our results across space is further confirmed upon testing for poolability between core and non-core EMU members. Specifically, following Vaona (forthcoming), we consider the S&P credit ratings in November 2013. We include in the core countries with at least A- and in the periphery countries with lower grades. Therefore, we define the core Euro area as composed of Austria, Finland, Germany, the Netherlands, Belgium, Estonia, Luxembourg, Slovakia, Slovenia and France. While Greece, Ireland, Portugal, Spain, Italy, Cyprus and Malta are the periphery. We generate a *core* dummy and interact it with the constant, the log of income and the log of CPI. None of these regressors is statistically significant at the 5% level. So we conclude that the pooled model is the correct one to test for money illusion.

[3] We also split the sample by income quartile. The results, available in the Appendix, still indicate the rejection of the money illusion hypothesis. The p-values for the four quartiles - from the lowest to the highest - are 0.745, 0.881, 0.995, 0.610.

not concentrate in the area of economic literacy for instance, but rather on structural reforms, national policy co-ordination and greater integration of economic policies (Moro, 2014). Recommendations about what weights to attribute to each of these three routes are beyond the scope of this note.

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Figures

Table 1: Summary statistics

	Observations	Mean	St. Dev.
SWB (Life satisfaction)	696699	3.058	0.754
Log of CPI	724699	67.004	16.467
Income	510036	9.472	2.278
Unemployment rate	724699	0.088	0.039
Log of GDP	724699	26.891	1.232
Occupational status:			
Unemployed	724699	0.066	0.248
Self-employed	724699	0.087	0.282
Retired	724699	0.189	0.391
House keeping	724699	0.156	0.362
Student	724699	0.083	0.277
Military	724699	0.000	0.022
Female	724543	0.518	0.500
Age	724397	43.202	18.143

Notes: Microeconomic variables are from the Eurobarometer database (1980-2011). Macroeconomic controls are from the World Bank's World Development Indicators (WDI). Log of GDP corresponds to the annual, PPP-adjusted per capita GDP. Unemployment is calculated on an annual base. CPI was downloaded from the OECD statistical website.

Table 2: Regression results and money illusion tests

	EMU Countries	Before EMU	After EMU	All Countries	DFS-EMU	DFS – All countries
Log CPI	-0.134**	-0.131**	2.121	-0.132***		
	(0.045)	(0.050)	(2.702)	(0.044)		
Log Income	0.164***	0.164***	0.162***	0.146***	0.164***	0.145***
	(0.025)	(0.026)	(0.023)	(0.020)	(0.025)	(0.020)
Income differential					0.134**	0.132***
					(0.045)	(0.044)
Money Illusion test (*p-value*)	0.440	0.44	0.720	0.100	0.440	0.100
	(0.507)	(0.506)	(0.396)	(0.756)	(0.507)	(0.756)
Observations	321,825	287,171	34,654	411,350	321,825	411350

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.054, * p<0.1. The individuals' characteristics included are: age, age-squared, gender, marital status, household size, educational attainment, work status. We include a set of country and year fixed effects. DFS refers to the Deckers *et al.* (2013) tests. Income differential is the difference between the log of real income and the log of nominal income. In the first four columns the money illusion statistic tests whether the sum of the coefficients of the logs of nominal income and CPI is equal to zero. In the last column the money illusion statistic tests whether the difference between the logs of nominal income and of the income differential is equal to zero. The tests are distributed as a χ^2 with one degree of freedom. The EMU countries are: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain. Non EMU countries are: Denmark, Norway, Sweden, Switzerland, the United Kingdom. Complete regression results are available in the Appendix.

Appendix

Table A1. Money illusion test by income quartile

Income quartile	Money Illusion test
1st Quartile	0.110
	(0.745)
2nd Quartile	0.020
	(0.881)
3rd Quartile	0.000
	(0.995)
4th Quartile	0.610
	(0.433)

Notes: the test for money illusion checks whether the sum of the coefficients of the logs of nominal income and CPI is equal to zero. The tests are distributed as a χ^2 with one degree of freedom.

Table A2: Full Regression results

	EMU Countries	Before EMU	After EMU	All Countries	DFS-EMU	DFS – All countries
Log CPI	-0.135***	-0.131***	2.121	-0.132***		
	(0.046)	(0.051)	(2.702)	(0.045)		
Log Income	0.164***	0.164***	0.163***	0.146***	0.164***	0.146***
	(0.025)	(0.028)	(0.023)	(0.021)	(0.025)	(0.021)
Income differential					0.135***	0.132***
					(0.046)	(0.045)
Unemployment	-1.169***	-1.596***	-2.342	-1.047**	-1.169***	-1.047**
	(0.437)	(0.421)	(1.875)	(0.433)	(0.437)	(0.433)
Log GDP	-0.359***	-0.366***	-0.298***	-0.347***	-0.359***	-0.347***
	(0.041)	(0.042)	(0.051)	(0.037)	(0.041)	(0.037)
Unemployed	0.016	0.019	-0.006	0.013	0.016	0.013
	(0.012)	(0.015)	(0.023)	(0.011)	(0.012)	(0.011)
Self-employed	0.025	0.026	0.028	0.011	0.025	0.011
	(0.024)	(0.024)	(0.019)	(0.019)	(0.024)	(0.019)
Retired	0.031**	0.033**	0.000	0.015	0.031**	0.015
	(0.014)	(0.014)	(0.028)	(0.015)	(0.014)	(0.015)
Home keeping	0.118***	0.127***	-0.069	0.103***	0.118***	0.103***
	(0.039)	(0.047)	(0.098)	(0.034)	(0.039)	(0.034)
Student	0.107*	0.107	0.000	0.121**	0.107*	0.121**
	(0.063)	(0.066)	(0.000)	(0.062)	(0.063)	(0.062)
Military	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Household size (1)	-0.011	-0.008	-0.029**	-0.010	-0.011	-0.010
	(0.024)	(0.026)	(0.014)	(0.019)	(0.024)	(0.019)
Household size (2)	-0.041	-0.040	-0.044	-0.039*	-0.041	-0.039*
	(0.028)	(0.030)	(0.028)	(0.022)	(0.028)	(0.022)
Household size (3)	-0.042	-0.041	-0.040**	-0.037	-0.042	-0.037
	(0.039)	(0.039)	(0.019)	(0.027)	(0.039)	(0.027)
Household size (4 or more)	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Married	-0.071***	-0.067***	-0.101***	-0.077***	-0.071***	-0.077***
	(0.017)	(0.020)	(0.012)	(0.015)	(0.017)	(0.015)
Single	-0.241***	-0.250***	-0.207***	-0.240***	-0.241***	-0.240***
	(0.021)	(0.021)	(0.023)	(0.028)	(0.021)	(0.028)
Divorced	-0.160***	-0.163***	-0.142***	-0.158***	-0.160***	-0.158***
	(0.016)	(0.015)	(0.026)	(0.017)	(0.016)	(0.017)
Widowed	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Male	0.024	0.027*	0.008	0.033**	0.024	0.033**
	(0.019)	(0.015)	(0.010)	(0.013)	(0.019)	(0.013)
Female	-0.020***	-0.020***	-0.016***	-0.019***	-0.020***	-0.019***
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
Age	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Age squared	0.216***	0.226***	0.123	0.253***	0.216***	0.253***
	(0.052)	(0.057)	(0.102)	(0.047)	(0.052)	(0.047)
Still in full-time education	0.131***	0.142***	-0.108***	0.154***	0.131***	0.154***
	(0.028)	(0.030)	(0.024)	(0.026)	(0.028)	(0.026)
Up to 14 years	0.151***	0.162***	-0.081**	0.164***	0.151***	0.164***
	(0.025)	(0.027)	(0.041)	(0.022)	(0.025)	(0.022)
Up to 15 years	0.155***	0.166***	-0.086***	0.173***	0.155***	0.173***
	(0.031)	(0.030)	(0.018)	(0.028)	(0.031)	(0.028)
Up to 16 years	0.177***	0.190***	-0.074***	0.202***	0.177***	0.202***
	(0.035)	(0.032)	(0.020)	(0.032)	(0.035)	(0.032)
Up to 17 years	0.200***	0.211***	-0.041*	0.225***	0.200***	0.225***
	(0.038)	(0.035)	(0.021)	(0.036)	(0.038)	(0.036)
Up to 18 years	0.200***	0.208***	-0.019	0.228***	0.200***	0.228***
	(0.032)	(0.035)	(0.021)	(0.031)	(0.032)	(0.031)
Up to 19 years	0.216***	0.228***	-0.033	0.244***	0.216***	0.244***
	(0.037)	(0.039)	(0.026)	(0.034)	(0.037)	(0.034)
Up to 20 years	0.223***	0.233***	-0.010	0.255***	0.223***	0.255***
	(0.042)	(0.046)	(0.028)	(0.037)	(0.042)	(0.037)
Up to 21 years	0.233***	0.243***	0.000	0.258***	0.233***	0.258***
	(0.037)	(0.042)	(0.000)	(0.033)	(0.037)	(0.033)
22 years or older	-0.135***	-0.131***	2.121	-0.132***	0.164***	0.146***
	(0.046)	(0.051)	(2.702)	(0.045)	(0.025)	(0.021)
Observations	321,825	287,171	34,654	411,350	321,825	411350

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.054, * p<0.1. All regressions include a set of country and year fixed effects.