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Evidence from the PSID, 1999-2009.

Abstract

In this paper we estimate the relevance of habits versus interpersonal comparisons for the consumption behavior of U.S. households. We exploit information from the recently released consumption expenditure data of the Panel Study of Income Dynamics (PSID) covering the time span from 1999 to 2009. We find that both habits, measured as lagged consumption, and envy motives, measured as reactions of consumption to consumption changes of households that are perceived to be richer, matter substantially. Hence, household consumption is not only determined by habit persistence but also by interpersonal comparisons. Most importantly, our estimations reveal that envy motives might play a much more prominent role for households' consumption choices than habits do.

JEL ref.: C23, D12, D91, E21.

Keywords: Household Consumption, Reference Consumption, Habits, Relative Income Hypothesis, Difference GMM, PSID.

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In this paper we estimate the relevance of habits versus interpersonal comparisons for the consumption behavior of U.S. households. We exploit information from the recently released consumption expenditure data of the Panel Study of Income Dynamics (PSID) covering the time span from 1999 to 2009. We find that both habits, measured as lagged consumption, and envy motives, measured as reactions of consumption to consumption changes of households that are perceived to be richer, matter substantially. Hence, household consumption is not only determined by habit persistence but also by interpersonal comparisons. Most importantly, our estimations reveal that envy motives might play a much more prominent role for households' consumption choices than habits do.

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1 Introduction

The question as to whether habit and/or envy motives affect the consumption choices of households is attracting ever more attention. This is not only due to the fact that availability and quality of survey data on consumption expenditures have steadily improved. It is also because of a considerable number of economists, such as Iacoviello (2008), Al-Hussami and Remesal (2012), Alvarez-Cuadrado and El-Attar Vilalta (2012) and Kumhof et al. (2012), have turned their attention to the implications of changes in the distribution of economic resources within industrialized societies. "Keeping up with the Joneses"-consumption behavior, as predicted by the Relative Income Hypothesis of Duesenberry (1949), is among the basic microeconomic mechanisms that help explain macroeconomic developments. Although research on well-being and happiness has shown that interpersonal comparisons are a central trait of human behavior - see Kapteyn et al. (1997), Ferrer-i-Carbonell (2005), Luttmer (2005) or Dynan and Ravina (2007) - so far there are only few studies examining whether positional concerns indeed affect the economic decisions of households, e.g. Neumark and Postlewaite (1998), Ravina (2011), Alvarez-Cuadrado et al. (2012) and Drechsel-Grau and Schmid (2013).

In this paper we estimate the effects of habits and envy motives on consumption of U.S. households. To capture the characteristics of such behavior we apply difference GMM estimation on the Panel Study of Income Dynamics (PSID) consumption expenditure data. As is standard in this research, habits are approximated by lagged consumption. With regard to envy motives we construct the household's reference group based on two insights from well-being research: (i) Comparisons are directed upwards, i.e. it is primarily the consumption of richer households that induces envy. (ii) Households living in the same area are more likely to be part of the household's reference group.

We contribute to the literature in two ways: First, we estimate both habit and envy motives with a new data set from the recently released Panel Study of Income Dynamics (PSID) consumption expenditure data.[1] The consumption expenditure data from the PSID is the first household panel with extensive information on consumption expenditures of U.S. households.[2] Second, we find evidence for habit persistence and are able to show that interpersonal comparisons greatly affect consumption choices of U.S. households when reference consumption features upward-looking comparisons.

Our analysis is related to the study by Dynan (2000) and the recent contributions by Alvarez-Cuadrado et al. (2012) and Ravina (2011) who estimate Euler equations

[1] When carrying out this analysis, in October 2013, these data have only been available for approximately 6 weeks.

[2] Until August 2013, the PSID only offered data on food consumption. The CEX includes very detailed consumption data but is not structured as a panel.

stemming from a utility function that features both habit and envy motives. Alvarez-Cuadrado et al. (2012) use Spanish household data and Ravina (2011) uses credit card data of U.S. households. Employing the growth rate of consumption expenditures as the dependent variable these studies find evidence for both habit formation and interpersonal comparisons. Dynan (2000) finds no evidence for habit persistence using food expenditure data from the PSID. Moreover, our conceptual approach for modeling the envy motive builds on the framework suggested by Drechsel-Grau and Schmid (2013). Reference consumption is approximated as the mean consumption of households that are perceived to be richer and live in the same region as defined by the United States Census Bureau.

Our findings show that the consumption decisions of U.S. households are to a large extent driven by upwardly directed interpersonal comparisons. Consumption habits also exhibit significant effects when measured at a biannual frequency. However, our estimates suggest that within the considered time span from 1999 to 2009 interpersonal comparisons were more important than intertemporal concerns.

The remainder of this paper is structured as follows. Section 2 explains our conceptual approach and the empirical strategy and section 3 introduces the data. Section 4 presents our econometric results and section 5 concludes.

2 Empirical Strategy

We assume that a household's marginal utility of consumption services is positively affected by both own past consumption (habit motive) and the consumption level of the household's reference group (envy motive). Moreover, several socio-economic characteristics of the household such as age as well as macro-level factors such as the real interest rate influence consumption choices. We seek to identify the strength of both motives (habits and envy) with the empirical model given in equation (1).[3]

$$c_{i,t} = \alpha_i + \beta_1 c_{i,t-1} + \beta_2 \bar{c}_{i,t} \times STAY_{i,t} + \beta_3 \bar{c}_{i,t} \times HOP_{i,t} + \gamma X_{i,t} + \lambda_t + \epsilon_{i,t} \qquad (1)$$

This model implies that household consumption c_t is determined by past consumption c_{t-1} and reference consumption, i.e. the consumption of households who are perceived to be richer $\bar{c}_t$. The vector of control variables $X_{i,t}$ includes household post-government income, the number of adults and children living in the household, the number of years

[3]One could easily derive a similar equation by log-linearizing an Euler equation that is derived from a standard isoelastic utility function with a habit and envy motive. The only exception would be the fact that growth rates rather than the levels of own and reference consumption are used. See, for example, Dynan (2000).

of education, hours worked, age and age squared of the household head. Macroeconomic factors are captured by a full set of yearly time dummies λ_t.

As the PSID gathers data every two years, $c_{i,t-1}$ is actually the household's consumption level from two years ago.[4] Turning to interpersonal comparisons, we basically follow the approach of Drechsel-Grau and Schmid (2013). While most of the literature approximates envy motives by outward-looking measures such as the mean income or consumption in specific regions or by socio-demographic subgroups, we additionally assume that comparisons are directed upwards.[5] The household's reference group comprises all households that are perceived to be richer. That is, we use the distribution of total consumption expenditures in order to approximate the household's relative position in the economic hierarchy. Consequently, we define the household's reference group as all households that belong to consumption deciles above the household's own consumption decile. We construct this variable by four regions (Northeast, South, Midwest, West) as defined by the United States Census Bureau (see table **??** in the appendix). In sum, a household's reference group comprises all households that are perceived to be richer and live in the same region. Our dependent variable is nondurable consumption, i.e. we exclude housing expenditures to preserve our results from being heavily influenced by local volatility in housing prices. However, reference consumption includes housing expenditures as these make up a considerable part of perceived richness which is the factor that defines one's relative position and social status.

As has been outlined by Drechsel-Grau and Schmid (2013), the construction of this concept of reference group comes at the cost of potential reverse causality when examining within variation over time. This is because consumption changes might coincide with a change of consumption class implying the assignment of a new reference group. To control for reverse causality we implement a dummy variable that distinguishes households that stay in their consumption class and those who hop classes over time. In equation (1), $STAY_{i,t}$ equals one if the household does not change its consumption class j from period $t-1$ to t and $HOP_{i,t}$ equals one if the household does change its consumption class. The relevant effect of envy is thus identified by β_2.[6]

[4] Compared to, for example, quarterly data as used by Alvarez-Cuadrado et al. (2012) and Ravina (2011), this is a rather long time span.

[5] This assumption rests on studies such as Ferrer-i-Carbonell (2005) or Alvarez-Cuadrado and El-Attar Vilalta (2012) who present empirical evidence for upwardly directed comparisons.

[6] This is a rather conservative approach as the coefficient estimate for those who do not hop consumption classes is likely to provide a lower bound of the overall effect. This is because at least some consumption class changes are the result of interpersonal comparisons. Those households who place more weight on the interpersonal comparisons have a higher probability to self-select themselves into the hopper-group.

As we model the habit motive by including the first lag of the dependent variable conventional least squares estimation will suffer from dynamic panel bias. To rectify this shortcoming we consistently estimate our specification by two-step difference GMM in the tradition of Arellano and Bond (1991).[7] We treat own consumption, reference consumption, hours worked and household income as endogenous. We use all suitable lags as instruments except for reference consumption where we exclude the first available lag for endogeneity reasons. Furthermore, we transform the data using the forward orthogonal deviation transform. That is, we subtract the mean of all available forward observations in order to make the lags orthogonal to the fixed effects.

3 Data

Our analysis is based on household data from the Panel Study of Income Dynamics (PSID). We exploit information from the recently released PSID consumption expenditure data set. These data contain consumption statements on the household level in a two-year frequency from 1999-2009. Household consumption is constructed by adding up all available expenditure categories comprising food, housing, transportation, education, child care and health care. In each available period the raw data are provided for between approximately 7,000 and 8,000 households. The total data set consists of 47,206 observations. When preparing our sample for the analysis we impose the following restrictions: We drop households with post-government income below 6000 dollars or above 2 million dollars per year in order to limit the effects of outliers. Moreover, we drop all households with consumption below or equal to zero. Subsequently, we drop all remaining households with consumption ratios below 5 percent or above 500 percent. Lastly, we drop all households with non-working household heads to rule out the impact of changes in the employment status upon consumption adjustments. We end up with a sample consisting of 37,100 observations. Table 2 in the appendix provides basic summary statistics for our main variables.

4 Results

Table 1 reports estimation results of equation (1). Columns (1) and (2) show the results of the pooled OLS (POLS) and fixed effects (FE) estimator. In both regressions we apply robust standard errors clustered at the household level. As illustrated by Bond (2002), these estimates provide the lower and upper bounds for lagged consumption. The lower bound equals -0.046 whereas the upper bound is 0.114. For our measure of

[7] We apply the xtabond2 package in STATA as outlined in Roodman (2006).

reference consumption we find a positive effect in each of the two specifications. All these estimates are highly statistically significant but obviously suffer from dynamic panel bias.

Table 1: Estimation Results for Habit and Envy Motives.

	(1) POLS	(2) FE	(3) GMM	(4) GMM (std.)
c_{t-1}	0.1140***	-0.0457***	0.0498***	0.0435***
	[0.0068]	[0.0053]	[0.0121]	[0.0138]
$\bar{c}_t \times STAY$	0.4017***	0.4791***	0.3484***	0.5479***
	[0.0060]	[0.0062]	[0.0377]	[0.0686]
Instruments			44	44
AR(1)			0.0000	0.0000
AR(2)			0.1173	0.1121
Hansen J-test			0.3769	0.3936
Observations	21,904	21,904	15,185	15,185
Number of hid		7,295	5,789	5,789

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

Notes: The sample is from the Panel Study of Income Dynamics (PSID) consumption expenditure data. The panel is unbalanced and covers the years from 1999 to 2009 in a two-year rotation. The dependent variable is real household nondurable consumption. Standard errors are in brackets and p-values marked as stars. *, ** and *** denote significance at the 10%-, 5%- and 1%-level, respectively. POLS and FE regressions use robust standard errors clustered by the household id. GMM regressions use robust standard errors and treat lagged consumption as predetermined. For instrumenting we use all available lags starting at $t-2$. We apply two-step GMM estimations and employ the Windmeijer (2005) finite sample correction for standard errors. In all regressions the number of annual work hours, age and age^2 of the household head, the number of adults and the number of children living in the household as well as time dummy variables are added as control variables. The row for the Hansen J-test reports the p-values for the null hypothesis of instrument validity. The values reported for AR(1) and AR(2) are the p-values for first and second order autocorrelated disturbances in the first differences equations.

Columns (3) and (4) report results from difference GMM estimations. In column (3) we illustrate our basic coefficient estimates whereas column (4) contrasts these with the estimation of standardized variables.[8] This allows us to directly compare the strength of the impact of habits versus envy motives. All GMM regressions use robust standard errors and treat lagged consumption as predetermined. The corresponding estimate lies within the bounds shown in columns (1) and (2).

Below the area showing our coefficient estimates and the corresponding inference we report the p-values for the null hypothesis of the validity of the overidentifying restrictions. This is documented in the row for the Hansen J-test. We do not reject

[8]Reference consumption is standardized to have the same standard deviation and mean as the dependent variable.

the null of valid instruments. The values reported for AR(1) and AR(2) are the p-values for first and second order autocorrelated disturbances in the first-differenced equation. We find high first order autocorrelation and no evidence for significant second order autocorrelation. These test results indicate a proper specification.

Our estimates imply that both habit and envy motives matter for the consumption of the household. The estimation of the habit component yields a coefficient of 0.050.[9] The effect of reference consumption is approximately 0.348. The estimation results based on standardized variables, which are reported in column (4), confirm that the envy motive contributes substantially more strongly to the development of household consumption than the habit motive does. In addition, one can safely expect that the effect of the habit motive increases with the frequency of the panel. The fact that the consumption level from two years ago exhibits a significant effect on households' consumption choices is thus strong evidence for the importance of habit formation.

5 Conclusion

Consumption decisions are determined by both habit and envy motives. We estimate the consumption behavior of U.S. households from the recently released Panel Study of Income Dynamics (PSID) consumption expenditure data covering the years from 1999 to 2009. We model habits as the two-year lag of household consumption. Interpersonal comparisons are approximated by a measure of upward-looking reference consumption, i.e. the consumption level of households that live in the same region of the U.S. and, most importantly, are perceived to be richer. We find that habits and especially reference consumption exhibit substantial effects on the consumption choices of U.S. households. Our results provide evidence for the hypothesis that interpersonal comparisons in household consumption are directed upwards and that these comparisons do affect the economic decisions of households. Our regression outcomes support the modeling of macroeconomic phenomena using heterogenous agents and provide evidence for an important microeconomic mechanism that can explain why and how changing inequality can trigger macroeconomic developments such as falling aggregate savings and rising indebtedness.

[9] Compared to the findings of Alvarez-Cuadrado et al. (2012) and Ravina (2011) this estimate appears to be rather small. However, both of these analyses are carried out on the basis of quarterly data, whereas our panel is in a two-year frequency.

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Appendix

Table 2: Summary Statistics of Main Variables.

	N	MEAN	P50	STD.DEV.	MIN	MAX
c	37,100	23,723	20,525	15,984	0	38,6381
$\bar{c}$	33,921	64,310	57,061	23,813	31,084	15,9362
inc	37,100	54,023	42,869	52,653	6,004	1983,894
annual hours worked	37,100	2,087	2,068	720	52	5,824
adults	37,100	1.9	2	0.8	1	9
children	37,100	1.0	1.0	1.2	0	9
age	37,097	41	41	12	16	93
age^2	37,097	1,863.6	1,681	1,107	256	8,649

Table 3: Regions as Defined by the United States Census Bureau.

Region	States
Northeast	Connecticut, Delaware, D.C., Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont
South	Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia
Midwest	Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin
West	Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming

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