The Journal of Socio-Economics 45 (2013) 146–154

Contents lists available at SciVerse ScienceDirect

The Journal of Socio-Economics

journal homepage: www.elsevier.com/locate/soceco

A test of the conspicuous–consumption model using subjective well-being data☆

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ARTICLE INFO

Article history:
Received 19 August 2012
Received in revised form 10 May 2013
Accepted 11 May 2013

JEL Classification:
D60
D12
D31

Keywords:
Conspicuous consumption
Signaling
Subjective well-being

ABSTRACT

According to the conspicuous–consumption theory, people consume highly observable goods to signal their wealth to others. A growing body of evidence favors this signaling model. However, the empirical evidence available is still far from conclusive; thus, we provide evidence from a new angle. We show that the signaling model of conspicuous consumption predicts that a consumer's well-being should increase based on his or her household's ranking of observable consumption within its reference group, but should not be affected by its ranking in the distribution of unobservable consumption. We test this prediction using panel data on household expenditure and subjective well-being. Our evidence is consistent with the predictions of the signaling model.

1. Introduction

According to the conspicuous–consumption theory, people consume highly observable goods to signal that they are wealthy to others. Economists have been interested in this model because of its many policy implications. For example, since an increase in one's conspicuous consumption imposes a negative externality on others, a tax on conspicuous goods can correct the distortion imposed by this externality (Frank, 1985). Competition for status through conspicuous consumption can generate other types of positional externalities, which can lead to significant policy implications such as pareto-improving income-tax schedules (Ireland, 1994).[1]

There is a growing body of evidence supporting the signaling model of conspicuous consumption, including diverse methodologies such as analysis of expenditure data (Charles et al., 2009; Heffetz, 2011), stated preferences (Carlsson et al., 2007), and laboratory experiments (Fennis, 2008).[2] One basic prediction of the signaling model is that a household's conspicuous consumption should depend on the wealth of other households in the same reference group. Charles et al. (2009) test this hypothesis with data from the Consumer Expenditure Survey (CEX). They show that an individual's expenditure on highly observable goods (clothing and cars) is negatively correlated with the mean income in their state of residence.[3] Kuhn et al. (2011) offer related evidence on the link between reference-group income and conspicuous consumption. They study a special lottery in the Netherlands that awards prizes to every ticket holder in a randomly selected postal code each week. They show that when many households win the lottery in one postal code, the non-winning households in that neighborhood change their consumption of items that are highly observable in the context of the neighborhood (e.g., major exterior home renovations).

Heffetz (2011) measures the visibility of thirty-one consumption categories using a nationally representative survey among US households, and then matches the visibility indices with the CEX data on household expenditure. He shows that higher-income households spend larger shares of their budgets on some (but not all) visible goods, a pattern consistent with the conspicuous–consumption model. Glazer and Konrad (1996) study the signaling value of donations to US universities. They show that for institutions that report the names of donors in donation categories (e.g., $1000–1999, $2000–2999), most donations within a given category are very close to the lower bound of that category. This pattern is consistent with the idea that donors do not only care about helping universities, but also care about being perceived by others as richer and/or more generous than others.

☆ Thanks to Rafael Di Tella and Ori Heffetz for very useful comments, and thanks to two anonymous referees for their valuable suggestions. The usual disclaimer applies.

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[1] For a more extensive review of policy implications, see Section 4 from Heffetz and Frank (2011).

[2] For a recent review of empirical studies, see Heffetz and and Frank (2011).

[3] For a discussion of the implications of this correlation, see Perez-Truglia (2011).

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http://dx.doi.org/10.1016/j.socec.2013.05.012

Even though the existing empirical evidence suggests that the conspicuous–consumption model may be accurate, the evidence is not conclusive (Heffetz and Frank, 2011). The main concern is that the patterns of data attributed to conspicuous consumption could be caused by confounding factors. For instance, households in richer states may be intrinsically less attracted to observable goods like cars and clothing, thereby providing a non-signaling interpretation of the findings from Charles et al. (2009). Similarly, goods that are highly observable may become intrinsically more attractive as a household gets richer, thereby providing a non-signaling explanation of the consumption patterns found in Heffetz (2011). This paper tests the signaling model of conspicuous consumption from a different angle: we show that the conspicuous–consumption model predicts that a consumer's well-being should increase with its household's ranking of observable consumption in the reference group, but should not be affected by its ranking in the distribution of unobservable consumption. We test this prediction using panel data on household expenditure and individual well-being. Our results are consistent with the predictions of the conspicuous–consumption model.

The paper proceeds as follows. Section 2 presents a simple model of conspicuous consumption, which provides the predictions to be tested. Sections 3–5 present the econometric model, data and estimation results, respectively. Section 6 concludes.

2. The signaling model of conspicuous consumption

Non-market goods (NMG) are goods and services that people consume, but cannot be traded in formal markets (Scitovsky, 1976). Some examples are respect, admiration, authority, and relationships. According to the signaling theory of conspicuous consumption, people consume goods that are highly visible to signal that they are wealthy, increasing their likelihood of obtaining NMGs (Cole et al., 1995). Any good that can be observed by others may play the role of conspicuous good. For instance, in the empirical analysis of this study we focus on clothing. One can use expensive clothes to signal wealth to others, including total strangers (Charles et al., 2009). Indeed, some experimental evidence shows that people give preferential treatment to individuals wearing more expensive clothing. For example, people assume submissive postures when confronted by a person wearing a shirt with the logo of an expensive brand, whereas those people assume less submissive postures when the shirt is digitally modified to have no logo or a logo from a cheap brand (Fennis, 2008). People are also more likely to think that a candidate is better suited for a job if he or she is wearing a shirt with the logo of an expensive brand (Nelissen and Meijers, 2011).

A reference group is comprised by a continuum of individuals who differ in their wealth, y, distributed with a non-degenerate cumulative distribution $F_y(\cdot)$ over the support $[y_0, y_1]$. An individual can spend its wealth in goods u (unobservable) and z (observable), and its preferences over those goods are represented by the utility function $U(u, z)$. All individuals must first choose how much to spend in each type of good, and after that they participate in interactions where they can obtain NMGs. An individual gets a utility of Π from each unit of a NMG obtained through an interaction.

One interaction involves $N+1$ individuals, randomly chosen from the reference group. One of those individuals (a.k.a. the "supplier") must choose who among the other N individuals (a.k.a. the "consumers") gets the one and only NMG provided in the interaction. For instance, the supplier must choose one person from a group of candidates to invite to an event, go out on a date or admire. The supplier would like to provide its one and only NMG to a consumer that is as wealthy as possible. The supplier cannot observe the income of each of the N consumers, but their consumptions in observable goods are observable. As a result, individuals can use consumption of observable goods to signal wealth. In a perfect-separating equilibrium the supplier will choose the consumer with the highest z. Even though all consumers value the NMG in Π, wealthier consumers will be more willing to sacrifice intrinsic utility from consumption in order to get the NMG because of decreasing marginal utility. As a result, conspicuous consumption will be equivalent to the bidding behavior in an all-pay auction where the distribution of valuations is determined by the distribution of wealth in the reference group.

Let's characterize the symmetric equilibrium. Let $b(y) = z$ denote the consumption behavior in the first stage. If an individual chose z, the probability of obtaining the NMG in one interaction is given by the probability of all the other $N-1$ conspicuous consumptions being lower than z. Assume that an individual expects to play the role of the consumer T times, sharing each of those interactions with different set of $N-1$ individuals. An individual should choose conspicuous consumption that solves the following maximization problem:[4]

$$\max_{z\in[0,y]} U(y-z,z) + T\cdot\Pi\cdot F_y(b^{-1}(z))^{N-1}$$

To characterize the perfect-separating equilibrium we need the FOC of the interior solution to the above problem, and also a boundary condition. The boundary condition simply states that the poorest household should not distort consumption towards the observable good:

$$\left\{ b'(y) = \frac{T\cdot\Pi\,(N-1)F_y(y)^{N-2}F'_y(y)}{U'_1(y-b(y),b(y)) - U'_2(y-b(y),b(y))}; b(y_0) = \arg\max_z U(y_0 - z, z) \right\}$$

If the conditions given in Mailath (1987) are met, this perfect-separating equilibrium exists and is unique.[5] The most important condition is the single-crossing condition, which in this application means that $-U'_1(y-z,z) + U'_2(y-z,z)$ has to be monotonically increasing in y. One way of guaranteeing the single-crossing condition is to assume that, in absence of NMGs, the *absolute level* of the observable consumption should be strictly increasing in the household's wealth.

This model produces a number of implications that can be tested with consumption data. For example, it predicts that the consumption choice should depend on both the household's absolute wealth and its relative wealth with respect to the other households in the same reference group (e.g., Charles et al., 2009; Perez-Truglia, 2011). In this study we test a prediction of this model that relates consumption choices with well-being. Denote $F_z(\cdot)$ to the cumulative distribution of observable consumption in the reference group. Let $V(y, z)$ be the expected utility of an agent who consumes z and $y-z$ in observable and unobservable goods, respectively:

$$V(y,z) = U(y-z,z) + T\cdot\Pi\cdot F_z(z)^{N-1}$$

While the utility from consuming the unobservable good depends only on own consumption (through the first term on the RHS, the "intrinsic utility"), the utility from consuming the observable good depends partly on own consumption (also through the first term on the RHS) but also on the consumption relative to the rest of the households in the reference group, $F_z(z)$ (through the second term

[4] For the sake of simplicity, u, z and y are all expressed in units of the unobservable good – it is straightforward to relax this assumption to allow for a relative price between u and z different from one.

[5] In the notation of Mailath (1987), the utility function is given by $\tilde{U}\left(\alpha, \alpha^{-1}(y), y\right) = U(\alpha - y, y) + T\cdot\Pi\cdot F_y(\alpha^{-1}(y))^{N-1}$, where α stands for total expenditure, y stands for observable expenditure and $\alpha^{-1}(y)$ stands for the supplier's belief about the wealth of the household given that the household is spending y in observable goods.

on the RHS, representing the expected utility from NMGs).[6] The following sections present a test of this prediction.[7]

3. Econometric model

Consider the following linear regression framework:

$$H_{it} = \beta_0 + \sum_{j=1}^{J} \left[\beta_j \ln\left(c_{it}^j\right) + \alpha_j F\left(c_{it}^j\right) \right] + X_{it}\beta_X + \omega_i + \chi_t + \xi_{it}$$

Subjective well-being is given by H_{it}, where the subscript i indexes individuals and the subscript t indexes years. Let c_{it}^j denote consumption in different categories j = 1, ..., J (e.g., clothing, food). The $F\left(c_{it}^j\right)$ is the ranking of c_{it}^j in i's reference group at time t (i.e., the share of households in i's reference group with consumption equal or below c_{it}^j). The β_j's and α_j's are parameters, β_X is a vector of parameters, X_{it} is a vector of control variables (e.g., standard socio-economic characteristics), ω_i denotes the individual fixed-effect, χ_t denotes the time effect and ξ_{it} is the usual error term. The prediction of the conspicuous–consumption model is that $\alpha_j > 0$ if j corresponds to a highly observable good and $\alpha_j = 0$ if j corresponds to a highly unobservable good.[8]

There are multiple potential sources of endogeneity bias for the β_j's and the α_j's.[9] One of the reasons for including individual fixed effects and other control variables is to mitigate such concerns. It is important to note that testing the prediction of the conspicuous–consumption model does not require to estimate the causal effect of relative consumption on happiness. Instead, we are mostly interested in examining whether the *correlation* between relative consumption and happiness differs across highly-observable and highly-unobservable goods. Let subscripts o and u denote highly-observable and highly-unobservable goods, respectively. We should worry about endogeneity biases if they are expected to affect α_o and α_u very differently. For instance, one type of bias that is likely to be present is the attenuation bias, because we measure consumption and reference groups with substantial measurement error. Given that the measurement error will bias both α_o and α_u towards zero, that will not affect significantly the comparison between those two coefficients. In this sense, some of the usual concerns about omitted-variable bias are not as problematic in this context.

Our empirical strategy is related to a large literature that studies the relationship between relative income within a reference group and subjective scores such as happiness (Clark et al., 2008) and job satisfaction (Card et al., 2012). These studies usually find a strong negative correlation between reference-group income and happiness while holding own-income constant. This reduced-form relationship may be caused by conspicuous consumption or a number of related phenomena, such as income comparisons, consumption expectations, and others. Instead, our study tests a prediction that is specific to the conspicuous–consumption model. Our empirical strategy is also related to Carlsson et al. (2007), who use hypothetical questions to measure the positionality of different goods (e.g., would you prefer a society in which everybody has a $100,000 car; or a society in which you have a $20,000 car, but everybody else has a $10,000 car?). They find that car consumption is positional, but leisure and car safety are not. Given that car consumption is arguably more observable than leisure and car safety, their findings are consistent with the conspicuous–consumption model. Our study is also related to Powdthavee (2009), who examines the relationship between happiness and positional and non-positional assets. Finally, our paper is closely related to Winkelmann (2012), who shows that income satisfaction is negatively correlated to the prevalence of luxury cars in the area of residence, a pattern that is also consistent with the conspicuous–consumption model.

4. Data

We used panel data from rounds 5 to 19 of the Russian Longitudinal Monitoring Survey[10] (RLMS), covering the period 1994–2010.[11] This data has been exploited in the past in studies about subjective-well being: e.g., about income comparisons (e.g., Senik, 2004) and about validation of subjective data (Perez-Truglia, 2010). The RLMS is representative of the entire Russian population, and the final sample used for the regression analysis includes over 140,000 observations for more than 36,000 individuals. Table 1 shows data definitions and Table 2 shows summary statistics. The measure of subjective well-being is the standard *life satisfaction* question: "To what extent are you satisfied with your life in general at the present time?" The possible answers range from "not at all satisfied" (1) to "fully satisfied" (5).[12]

We used expenditure data as proxy for consumption. Testing the conspicuous–consumption model requires at least one consumption category that is highly observable and one that is highly unobservable. We used monthly expenditure in clothing as the observable category and monthly expenditure in food consumed at home as the unobservable category. Food consumed at home and clothing are some of the least and most observable goods, respectively, according to the visibility surveys of Heffetz (2011) and Charles et al. (2009).[13] The variable of food expenditure was constructed using questions on expenditure during the past week for more than fifty food items, and also includes the estimated value of household production. The variable of monthly clothing expenditure was constructed using two questions about expenditure on clothing items during the past three months. The RLMS also asks a battery of questions about multiple sources of income to construct a measure of household monthly income. All income and expenditure variables are expressed in terms of monthly rubles as of year

[6] The model in Glazer and Konrad (1996) also makes a similar prediction: i.e., happiness should be increasing in both absolute and relative consumption of the observable good. One advantage of our model is that, unlike Glazer and Konrad (1996), it provides a closed-form solution for $V(y, z)$.

[7] We must note, however, that we will not attempt an structural estimation of the primitives of the model presented in this section. For instance, different specifications of the structural model (e.g., different values of N) would predict different functional forms for the relationship between well-being and $F(z)$. We are only interested in testing whether there is *any* relationship between those two variables.

[8] Note that this baseline specification allows for a linear relationship between subjective well-being and $F(z)$, which in terms of the model from the previous section corresponds to the case with $N = 2$ (i.e., agents are matched in pairs). The results are robust if instead we allow for a non-linear relationship between relative income and happiness (e.g., adding a quadratic term).

[9] For example, due to utility-maximization, biases will arise if there is heterogeneity in any of these coefficients.

[10] Source: Russia Longitudinal Monitoring survey, RLMS-HSE, conducted by Higher School of Economics and ZAO "Demoscope" together with Carolina Population Center, University of North Carolina at Chapel Hill and the Institute of Sociology RAS. RLMS-HSE sites: http://www.cpc.unc.edu/projects/rlms-hse, http://www.hse.ru/org/hse/rlms.

[11] We start with round 5 because the administrators of the RLMS do not recommend using data from Rounds 1 to 4.

[12] In the regressions we use as dependent variable the raw response to the life satisfaction question, which is making the implicit assumption that the well-being measure is cardinal. The results are robust if we use an alternative (non-cardinal) model: e.g., if we use as dependent variable a dummy that takes the value 1 if the respondent reported to be "Rather satisfied" or "Fully satisfied" and 0 otherwise.

[13] Luxury expenditure is another expenditure category reported in the RLMS that is interesting for our analysis. However, nearly 90% of the respondents reported no expenditure in this category, leaving us no enough variation to analyze this category on a separate basis.

Table 1
Data definitions

Variable	Definition
Satisfaction with Life	Individual response to the question: "To what extent are you satisfied with your life in general at the present time? [Fully satisfied 5] [Rather satisfied 4] [Both yes and no 3] [Less than satisfied 2] [Not at all satisfied 1]"
Satisfaction with Economic Condition	Individual response to the question: "Tell me, please, how satisfied are you with your economic conditions at the present time? [Fully satisfied 5] [Rather satisfied 4] [Both yes and no 3] [Less than satisfied 2] [Not at all satisfied 1]"
Food Expenditure	Household monthly expenditure (in 2000 rubles) on food consumed at home, constructed by the RLMS using data on several questions on household expenditure: e.g., diary, fish, meat, potatos, bread, eggs, fats, fruits, sugar, other food and home production
Clothing Expenditure	Household monthly expenditure (in 2000 rubles) on clothing and shoes
Household Real Income	Household monthly income (in 2000 rubles), constructed by the RLMS using data on several sources of income, such as cash and non cash salaries, other paid work, unemployment benefits and pensions, state transfers (children's benefits, stipends, subsidies, etc.), private transfers (from family, relatives, friends, church, etc.), the value of home production of fruits, vegetables, dairy products and meat consumed or given away, net of the expenditure on home production (seed, fertilizers, etc.)

Notes: variables constructed from RLMS data over the period 1994–2010.

Table 2
Descriptive statistics

	Obs	Mean	SD	Min	Max
Life satisfaction	140,589	2.73	1.16	1.00	5.00
Economic satisfaction	109,424	2.27	1.00	1.00	5.00
HH food exp. (in thousands)	141,476	4.05	3.36	0.00	36.58
$Rank_1$(food exp.)	141,462	0.56	0.28	0.00	1.00
$Rank_2$(food exp.)	141,462	0.55	0.28	0.00	1.00
$Rank_3$(food exp.)	141,458	0.55	0.29	0.00	1.00
HH clothing exp. (in thousands)	141,476	0.94	1.54	0.00	20.89
$Rank_1$ (cloth exp.)	141,462	0.54	0.28	0.07	1.00
$Rank_2$ (cloth exp.)	141,462	0.53	0.28	0.10	1.00
$Rank_3$ (cloth exp.)	141,458	0.53	0.28	0.03	1.00
HH income (in thousands)	141,476	10.47	10.37	−27.19	164.33
$Rank_1$ (income)	141,462	0.57	0.28	0.00	1.00
No. household members	141,476	3.30	1.59	1.00	13.00
Dummy urban	141,476	0.73	0.44	0.00	1.00
Dummy HH head > 45 years old	141,462	0.48	0.0	0.00	1.00
Dummy HH head > 9 years education	141,462	0.60	0.49	0.00	1.00

Notes: data from the RLMS over the period 1994–2010. Expenditure and income are expressed in monthly rubles as of year 2000. See Table 1 for data definitions.

2000, when 1 U.S. dollar was worth approximately 28 rubles. To minimize the influence of outliers, we excluded observations with household expenditure or income in the top 0.1% of the respective distribution.

The average household in our sample spent $3547 in food, $812 in clothing, and had an income of $8873.[14] Thus, average food and clothing expenditure comprised about 50% of the average household income. Fig. 1 illustrates the distribution of clothing and food expenditure. For the vast majority of households, the share of clothing expenditure increases with the household's total expenditure (food + clothing) – this relationship is decreasing only among the top 1% of households. This pattern is largely consistent with the Engel curves found for clothing and other highly observable goods as reported in Heffetz (2011).[15]

For the construction of the variables on relative expenditure, we needed to define each household's reference group. As discussed in Section 2, clothing can serve to signal wealth in random interactions with strangers (Charles et al., 2009). Those strangers are likely to live and work near the place where the signaler lives and works. The other signalers competing for the same NMGs are also likely to live and work in the same geographical area. Thus, we employed the area of residence as the definition of a household's reference group. This geographic definition is certainly not perfect, but it is widely used in the literature on conspicuous consumption: e.g., Charles et al. (2009) explicitly define the reference group as the state of residence. The geographic proxy for reference group is also widely used in the literature on relative income and subjective well-being (for a discussion see Clark et al., 2008).

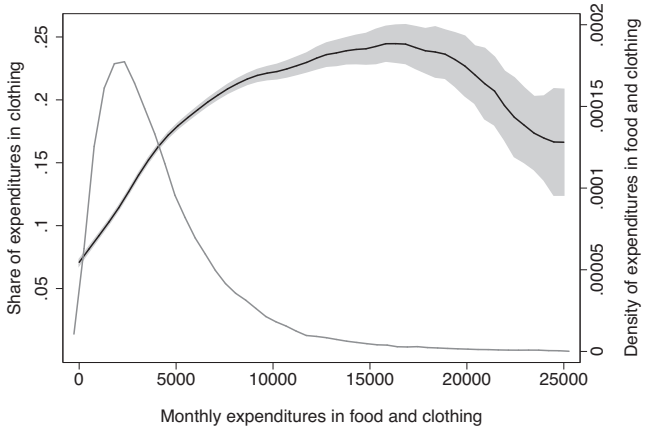


Fig. 1. Relationship between food expenditure and clothing expenditure. *Notes*: The *y*-axis contains the ratio of clothing expenditures to total expenditure (food + clothing). The darker line (left axis) corresponds to a local polynomial regression, with the shaded area denoting the corresponding 95% confidence interval. The lighter line (right axis) corresponds to a Kernel estimate of the density distribution of total expenditure (food + clothing). Data is from the period 1994 to 2010 of the RLMS. All expenditures are expressed in monthly rubles as of year 2000. See Table 1 for data definitions and Table 2 for descriptive statistics.

[14] These averages, computed across households, differ from those in Table 2 because the latter were computed across individuals.

[15] The absolute level of observable expenditure is non-decreasing in wealth, even for the top-1%, corresponding to one of the most basic properties of the conspicuous–consumption model.

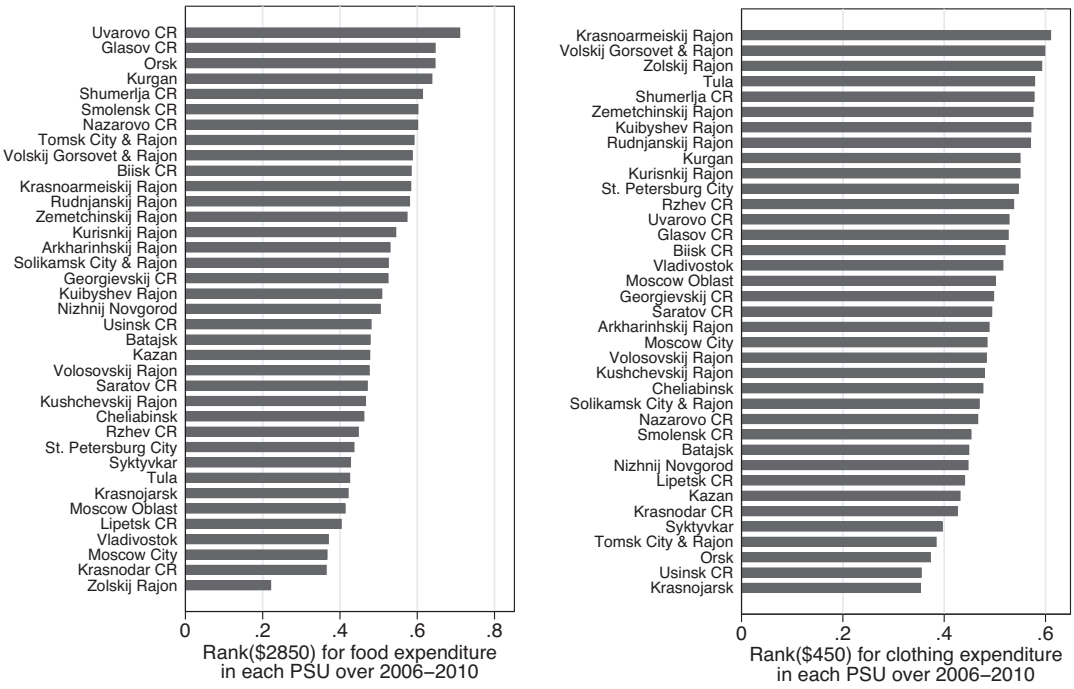


Fig. 2. Relationship between absolute expenditure and relative expenditure across PSUs. *Notes*: The bars in the left (right) panel correspond to the ranking of a food (clothing) expenditure level of $2850 ($450) in the distribution of expenditure for each PSU listed in the *y*-axis over the period 2006–2010 (there are no observations for PSU Surgut CR over this period). The expenditure level of $2850 ($450) corresponds to the median expenditure in food (clothing) over that period. All expenditure values are expressed in monthly rubles as of year 2000. Data from the RLMS. See Table 1 for data definitions and Table 2 for descriptive statistics.

We report results for three definitions of reference groups. $Rank_1()$ denotes the household's ranking among households in the same Primary Sampling Unit (PSU) and year (i.e., the share of households in the PSU-year with less or equal expenditure in the corresponding category). There are 38 PSUs in the RLMS, where each PSU typically corresponds to a city (e.g., Moscow City) or an oblast (e.g., Moscow Oblast).[16] $Rank_2()$ denotes the household's ranking among the households from the same PSU over a fixed 5-year window. $Rank_3()$ denotes the household's ranking among households with the same PSU, 5-years window, urban-rural status, education group[17] and age group.[18] Since the relative expenditure variables were constructed with expenditure data from the RLMS, it was important to have a critical number of surveyed households per reference group. In the definition of $Rank_1()$ (i.e., PSU-year) there were on average 136 surveyed households per reference group, with a minimum of 30 households and a maximum of 412 households. In the definition of $Rank_2()$ there were roughly five times as many surveyed households per reference group, with an average of 664 households per reference group. $Rank_3()$ is between $Rank_1()$ and $Rank_2()$, with an average of 163 surveyed households per reference group.

Each of our ranking variables takes a value from 0 (corresponding to the lowest level of expenditure in the reference group) to 1 (the highest). The absolute level of expenditure is strongly correlated to its relative level, but the correlation is not perfect: the correlation coefficients are between 0.67 and 0.88, depending on the definition of the reference group.[19] A given absolute level of expenditure can translate into very different values of relative expenditures depending on the PSU where the household resides. Fig. 2 illustrates the variation in relative expenditure when holding constant absolute expenditure. The left (right) half of Fig. 2 shows how a fixed expenditure level of $2850 ($450) in food (clothing) translates into different expenditure rankings depending on the PSU of residence, ranging from 0.22 to 0.71 (0.35–0.71). Furthermore, since we included individual fixed-effects in the regression, it is important to verify that there is significant within-individual variation in the main independent variables. Indeed, the within-individual variability in the ranking variables is comparable to the corresponding between-individual variability, and similar between the food and clothing categories.

Apart from the individual fixed effects and time effects, all the regressions include the same set of control variables: twenty dummy variables on household size and composition, four dummies for marital status, four dummies for working status, the number of hours worked and its square, age and its square, years of education, a dummy for household head, a dummy for urban status, a dummy for whether the household head finished at least 10 years of education and a dummy for household heads over 45 years old.[20] Although the variables on food expenditure and income have virtually no lower censoring (only 0.2% report zero food expenditure and 0.8% report no income), the variable on clothing expenditure does have substantial lower-censoring: approximately 32% of the observations on clothing expenditure are exactly zero. All regressions include a dummy variable indicating zero clothing expenditure, and for those observations we assigned a value of zero for the log of clothing expenditures (following Charles et al., 2009). The results were robust if we dropped all observations with zero clothing expenditure. For the sake of completeness, we followed the same procedure with food expenditure and income.

[16] For a full list of the PSUs in the sample see the *y*-axis of Fig. 2.
[17] A dummy variable indicating whether the household head completed at least 10 years of education.
[18] A dummy variable indicating whether the household head is 45 or older.
[19] These correlations exclude households with zero expenditures.
[20] We cannot include a set of dummies for PSU because, as a result of how the survey deals with movers, there is no within-individual variation in PSU.

Table 3
Baseline regression results

	(1) Life Sat.	(2) Life Sat.	(3) Life Sat.	(4) Life Sat.	(5) Life Sat.	(6) Life Sat.
Ln(Food exp.)	0.079***		0.078***		0.078***	0.077***
	(0.013)		(0.013)		(0.014)	(0.014)
$Rank_1$(Food exp.)	0.023		−0.005	−0.068		
	(0.036)		(0.036)	(0.051)		
$Rank_2$(Food exp.)					−0.005	−0.004
					(0.040)	(0.084)
$Rank_3$(Food exp.)						0.000
						(0.075)
Ln(Cloth. exp.)		0.008	0.002		−0.011	−0.011
		(0.009)	(0.009)		(0.010)	(0.010)
$Rank_1$(Cloth exp.)		0.199***	0.205***	0.176***		
		(0.055)	(0.055)	(0.065)		
$Rank_2$(Cloth exp.)					0.295***	0.014
					(0.064)	(0.090)
$Rank_3$(Cloth exp.)						0.268***
						(0.060)
Observations	140558	140558	140558	140558	140558	140554
R-squared	0.563	0.563	0.564	0.564	0.564	0.564
Individuals	36824	36824	36824	36824		
No. Clusters					36824	36824

Notes: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Heteroskedasticity-robust standard errors clustered at the individual level in parenthesis. Each column corresponds to a separate OLS regression with Life Satisfaction as dependent variable. Data is from the 1994 to 2010 period of the RLMS. $Rank_1()$($Rank_2()$) [$Rank_3()$] denotes the household's ranking within all the households in the same PSU and year (in the same PSU and 5-year window) [in the same PSU, 5-year window and urban/education/age categories]. All regressions include individual fixed effects, time effects, the same set of control variables (see the paper for the exhaustive list) and one dummy for each expenditure/income variable indicating whether expenditure/income is nonpositive (in which case the log of expenditure/income takes the value zero). Column (4) includes the absolute level of expenditure, its square and one dummy for each decile (both for food and clothing). See Table 1 for data definitions and Table 2 for descriptive statistics.

Table 4
Further Regression Results

	(1) Life Sat.	(2) Life Sat.	(3) Life Sat.	(4) Life Sat.	(5) Life Sat.	(6) Econ. Sat.	(7) Life Sat.	(8) Life Sat.
Ln(Food exp.)	0.078***	0.079***	0.079***	0.069***	0.078***	0.052***	0.066***	0.086***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.016)	(0.019)	(0.016)
$Rank_1$(Food exp.)	−0.005	0.004	−0.007	−0.053	−0.005	0.009	0.000	−0.007
	(0.036)	(0.036)	(0.033)	(0.037)	(0.036)	(0.044)	(0.053)	(0.045)
Ln(Cloth. exp.)	0.002	0.003	0.006	0.001	0.002	0.007	0.004	0.001
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.011)	(0.014)	(0.011)
$Rank_1$(Cloth exp.)	0.205***	0.200***	0.194***	0.147***		0.259***	0.147*	0.249***
	(0.055)	(0.055)	(0.053)	(0.055)		(0.065)	(0.083)	(0.069)
Ln(Income)				−0.003				
				(0.011)				
$Rank_1$(Income)				0.397***				
				(0.037)				
$Rank_1$(Cloth exp.), Cloth exp.>0					0.206***			
					(0.055)			
$Rank_1$(Cloth exp.), Cloth exp.=0					0.197			
					(0.131)			
Observations	140558	140575	140558	140558	140558	109394	140558	140558
R-squared	0.564	0.559	0.564	0.566	0.564	0.563	0.564	0.564
Individuals	36824	36829	36824	36824	36824	32130	36824	36824

Notes: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Heteroskedasticity-robust standard errors clustered at the individual level in parenthesis. Each column corresponds to a separate OLS regression with Life Satisfaction as dependent variable (except for the last column, where the dependent variable is Economic Satisfaction). Data is from the 1994 to 2010 period of the RLMS. $Rank_1()$ denotes the household's ranking within all the households in the same PSU and year. All regressions include individual fixed effects, time effects, the same set of control variables (see the paper for the exhaustive list) and one dummy for each expenditure/income variable indicating whether expenditure/income is nonpositive (in which case the log of expenditure/income takes the value zero). Column (1) reproduces column (3) from Table 3. Column (2) does not include control variables other than individual and year effects. In column (3) the expenditure variables are divided by the square root of the number of household members. Columns (6) and (7) present the effect of the expenditure variables for male (female) individuals. See Table 1 for data definitions and Table 2 for descriptive statistics.

5. Results

Tables 3 and 4 show the regression results.[21] Column (1) from Table 3 includes expenditure variables for food only, column (2) includes clothing only and column (3) includes food and clothing simultaneously. As predicted by the conspicuous–consumption model, life satisfaction increases with the ranking of clothing expenditure (highly observable) in the reference group, but it does not change with the ranking of food expenditure (highly unobservable). Increasing the absolute level of food expenditure increases satisfaction. But increasing the absolute level of clothing expenditure does not increase life satisfaction over and above the effect of relative clothing expenditure. In other words, this evidence suggest that people spend money on clothing almost exclusively for its signaling value – or at least for other reasons of positional nature.

The coefficient on the ranking of clothing expenditure is not only statistically significant, but it is also economically very significant.

[21] We always report heteroskedasticity-robust standard errors clustered at the individual level. The results are robust if we use instead standard errors clustered at the reference group level.

For example, a 0.1 increase in the ranking of clothing expenditure (i.e., a one decile increase) translates into a happiness gain of 0.02, which is roughly equivalent to the effect of a 25% increase in the absolute level of food expenditure. A dramatic change such as moving from the top to the bottom of the distribution of clothing expenditure would generate a drop in life satisfaction of about 0.2. This is an economically significant effect, equivalent to 25% of the within-individual standard deviation in life satisfaction. According to the coefficients on some of the control variables included in the regressions, this drop in life satisfaction of 0.2 is even higher than the effects of dramatic life events such as the death of an spouse (with an effect on life satisfaction of about −0.18), becoming unemployed (about −0.17) and being hospitalized at least once during the past three months (about −0.07).

One potential confounding factor is that the log-specification may not be the most appropriate functional form for the absolute expenditure variables, so the relative expenditure variables could be picking up a residual effect from this functional form misspecification. In order to deal with this concern, in column (4) we included – for both the food and clothing categories – the absolute level of expenditure, its square and one dummy per each expenditure decile. The results are similar to the baseline results in column (3). Another source of measurement error is that the sample of households used to construct the ranking variables may be too low. In $Rank_2()$ we constructed the expenditure rankings by pooling households from the same PSU over 5-year periods, instead of the 1-year periods used for $Rank_1()$. As a result, the average number of households in each reference group increases from 136 in $Rank_1()$ to 664 in $Rank_2()$. The coefficients in column (5) suggest that the results are even stronger under this alternative definition of reference group: the coefficient on food ranking is still close to zero and precisely estimated, while the coefficient on clothing ranking is roughly 50% higher than the corresponding coefficient from column (3).

We wanted to introduce two definitions of reference group simultaneously in the same regression, one nested within the other, and test which of the two definitions fits the data better. We followed Charles et al. (2009) in defining a reference group as a combination of the place of residence with the demographic characteristics of the household head.[22] The reference group in $Rank_2()$ is comprised by all households in the same PSU and 5-year window. The reference group in $Rank_3()$ is comprised by all households in the same PSU, 5-year window, urban status, education group and age group. Thus, the reference group in $Rank_3()$ is nested within that of $Rank_2()$. In column (6) we introduced $Rank_2()$ and $Rank_3()$ simultaneously in the same regression. The results suggest that $Rank_3()$ is a much better predictor of happiness than $Rank_2()$. Intuitively, an individual's happiness is affected by the clothing consumption of other households in the area, but mostly by the clothing consumption of the subset of those households that are demographically closer.

Table 4 reports some additional robustness checks. Column (1) reproduces column (3) from Table 3 (i.e., the baseline specification). In column (2) we reproduced the baseline regression but with no control variables other than individual and time effects. The coefficients in column (1) are practically identical to those in column (2), suggesting that the choice of control variables is not a reason for concern. Note that all expenditure variables used so far were constructed using raw measures of household expenditure instead of per-capita measures. In order to explore whether this specification choice could be problematic, column (3) reproduces column (1) but adjusting the expenditure data by dividing over the square root of the number of household members. The coefficients in column (3) are virtually the same than those in column (1). The results were also very similar if instead we used other equivalency scales (e.g., the OECD scale), if we made the per-capita adjustment for clothing but not for food, and viceversa.

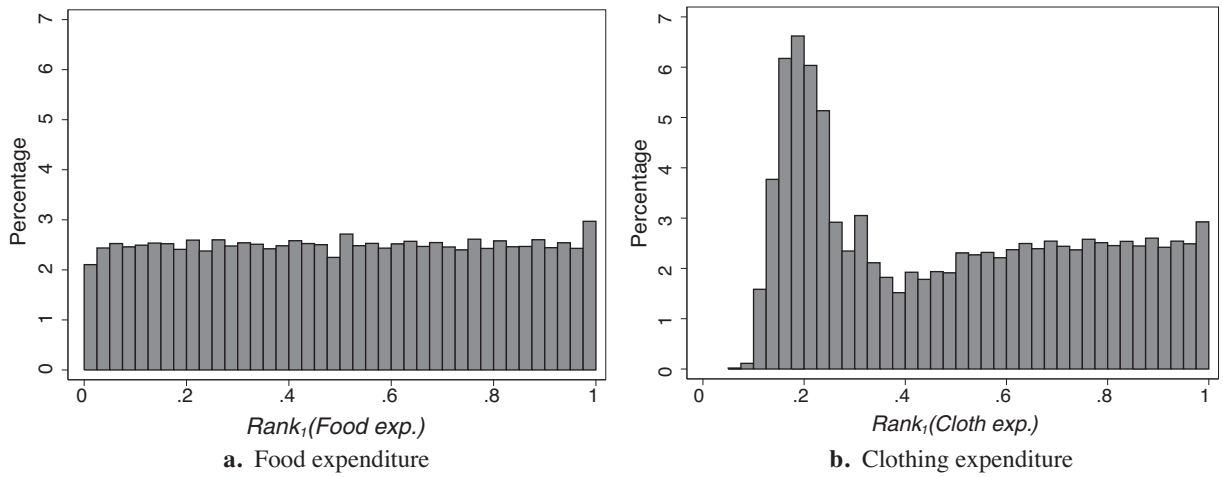
Recall that relative income has been found to be positively correlated to happiness, but possibly due to reasons unrelated to conspicuous consumption (Clark et al., 2008). Thus, our results would be compromised by an omitted-variable bias if, relative to food ranking, clothing ranking was more strongly correlated to income ranking. In order to deal with that concern, in column (4) we controlled for the absolute and relative level of household income. As expected, the coefficients on the expenditure variables are similar between column (4) and column (1). Consistent with the literature on relative income and well-being (Clark et al., 2008), relative income is positively correlated to happiness.[23]

Recall that 32% of the households report zero clothing expenditure but only 0.2% of households report zero food expenditure. One reason for concern is that this differential censoring may explain some of the differences in the coefficients between food and clothing categories. Fig. 3 shows histograms of the clothing ranking and food ranking. The distribution of food ranking is flat over its entire support. The distribution of clothing ranking is flat for rankings between 0.3 and 1, but for rankings between 0 and 0.3 this distribution is left-skewed. The absolute level of expenditure is zero for that bottom 30% of the observations, so the value of clothing ranking is given by the share of households with zero clothing expenditure in the same reference group. The concern is that the food ranking is more directly comparable to the clothing ranking for household with positive clothing expenditure (the top 70%) than for households with zero clothing expenditure (the bottom 30%). In column (5) we reproduced the specification from column (1) but, instead of introducing the clothing ranking as a single variable, we introduced two variables for clothing ranking: one variable for households with zero clothing expenditure and the other variable for households with positive clothing expenditure. We cannot reject the null hypothesis that the coefficients on those two variables are equal. Most importantly, those coefficients are statistically indistinguishable from the coefficient on clothing ranking reported in column (1). The coefficient on clothing ranking for zero clothing expenditure is less precisely estimated (p-value = 0.13) than the coefficient for positive expenditure, but that is to be expected given that the former coefficient is identified with less than half as much data (i.e., 32% of observations have zero clothing expenditure versus 68% for positive expenditure).

Column (6) from Table 4 reproduces the specification from column (1), but instead of using life satisfaction as dependent variable it uses a question about *economic satisfaction*: "How satisfied are you with your economic conditions at the present time?" Economic satisfaction offers an alternative measure of subjective well-being, which arguably makes more focus on material sources of happiness. The correlation between life satisfaction and economic satisfaction is 0.55. Note that the magnitudes of the coefficients are not directly comparable across regressions with different measures of subjective well-being. The coefficients from column (6) indicate that the results are qualitatively similar when using economic instead of life satisfaction as dependent variable. The sample size in column (6) is lower because the economic satisfaction question was included in the survey beginning in round 9.

[22] A natural extension to the geographic definition of the reference group would be to exploit data on finer geographical areas (see for example Brodeur and Flèche, 2013. However, there are important limitations for that exercise with the data that we employ.

[23] Some of this correlation is probably due to the fact that areas with higher income are more expensive. This correlation could also be confounded by informational effects (Senik, 2004).



a. Food expenditure **b.** Clothing expenditure

Fig. 3. Histograms of the relative expenditure variables. *Notes*: $Rank_1()$ is defined as the share of households in the PSU-year with less or equal expenditure in the corresponding expenditure category. Data from the RLMS over the period 1994–2010. See Table 1 for more data definitions and Table 2 for descriptive statistics.

The last two columns from Table 4 explore whether the expenditure variables have heterogeneous effects by gender.[24] In order to maximize the precision of the estimates, instead of running the regression for the sub-sample of male and female respondents separately, we used the full sample and included two versions of each of the expenditure variables: one interacted with a male dummy and another interacted with a female dummy. The coefficients on the male-variables are presented in column (7) and the coefficients on the female-variables are presented in column (8). The point estimates suggest that, relative to men, women get a higher intrinsic utility from household food expenditure and a higher signaling value from clothing ranking. However, for each of the coefficients on the expenditure variables, we cannot reject the null hypothesis that the coefficients are the same for men and women. We reproduced the analysis of heterogeneous effects for other demographic characteristics, but we did not find any significant heterogeneities. Even though the differences are not statistically significant, the point estimates suggest that – if anything – clothing consumption is more positional for women than for men, more positional for non-heads than for household heads, and more positional for younger than older individuals.

The evidence seems consistent with the prediction of the conspicuous–consumption model that an individual's happiness should increase with the household ranking in clothing expenditures but should not be affected by the ranking in food expenditures. However, conspicuous consumption may not be the only factor responsible for this finding. We can divide the potential confounding factors in two groups. One possibility is that clothing consumption is positional for reasons other than the signaling of wealth. For instance, people may consume goods to conform to specific identity norms (Akerlof and Kranton, 2000) in a way that can generate a correlation between one's happiness and peer consumption. Alternatively, the positionality of a good may respond to consumption expectations. The advantage of the conspicuous–consumption model is that it explains in a very natural way why clothing consumption is expected to be positional while food consumption is expected not to be positional: i.e., due to the difference in visibility. On the contrary, it is not clear why those alternative explanations would predict a positional nature for one consumption category but not for the other. In other words, it is not obvious why people would like to conform to social norms about clothing but not about food without resorting to a signalling argument.

The second group of confounding factors includes explanations not related to positional concerns. For example, when goods are highly non-tradable, relative expenditure is expected to correlate with happiness (holding absolute expenditure constant) if the regression specification does not control for the price level in the reference group. Intuitively, in poorer areas a given absolute level of expenditure translates into more consumption units, generating a correlation between relative expenditure and happiness. However, for this mechanism to explain why clothing ranking affects happiness but food ranking does not, we would need to assume clothing to be highly non-tradable and food to be highly tradable, which does not seems plausible.[25]

6. Conclusions

A growing body of evidence favors the signaling theory of conspicuous consumption. The existing empirical evidence exploits a variety of methodologies such as the analysis of expenditure data (Charles et al.,2009; Heffetz, 2011), stated preferences (Carlsson et al., 2007), and laboratory experiments (Fennis, 2008). However, the empirical evidence is still far from conclusive (Heffetz and Frank, 2011). In this study we show that one basic prediction of the conspicuous–consumption model can be tested in a very straightforward way using subjective well-being data: an individual's happiness should increase with his or her ranking in clothing consumption (highly observable), but should not be affected by his or her ranking in food consumption (highly unobservable). The empirical findings are consistent with this prediction of the conspicuous–consumption model.

We also discussed some possible confounding factors. The patterns observed in the data could be at least partially attributed to other positional concerns (e.g., consumption aspirations) and even to non-positional factors. Nevertheless, these identification challenges are not exclusive to our methodology; they are present to some extent in other empirical studies on conspicuous consumption. Although our evidence is not conclusive on its own, it contributes to the growing body of evidence in favor of the conspicuous–consumption model.

[24] We must note that the data corresponds to household expenditure, not individual expenditure, unless the individual belongs to a single-member household.

[25] Non-tradability is much more likely to explain some of the correlations between relative income and satisfaction, i.e., richer areas tend to be more expensive.

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