Conspicuous Consumption and Satisfaction

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Abstract

Traditional tools of welfare economics can identify the envy-related welfare loss from conspicuous consumption only under very strong assumptions. Measured income satisfaction offers an alternative for estimating such consumption externalities. The approach is developed in the context of luxury car consumption (Ferraris and Porsches) in Switzerland. Results from household panel data suggest that the prevalence of luxury cars in the area has a negative impact on others' satisfaction, with the biggest impact arising for the poor.

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1 Introduction

There is ample evidence that individual well-being is affected by comparisons with others. Status concerns are an important feature of our social existence. Higher ranked individuals are on average healthier (Wilkinson, 2000, Marmot, 2003) and live longer (Oswald and Rablen, 2008) than lower ranked ones. They also report higher levels of happiness in survey questions (Di Tella at al., 2007). Relatedly, actions of others provide a "frame of reference" for own decisions (Frank, 1991). As Karl Marx (1847) famously noted, "A house may be large or small; as long as the neighboring houses are likewise small, it satisfies all social requirement for a residence. But let there arise next to the little house a palace, and the little house shrinks to a hut."

For the economist, such positional concerns and frame of reference effects are important, as they can lead to inefficient market outcomes. For example, resources spent on improving one's status are wasteful from a societal point of view, as one person's gain is another person's loss. As Layard (1980) puts it "For, though individuals are willing to make sacrifices to improve their individual position, the net result of status-motivated action will be no increase in status satisfaction but an increase in sacrifice." (p. 738). Perhaps the best studied example of such wasteful competition occurs in the presence of relative consumption effects, i.e. if an individual's utility depends not only on the level of her own consumption but also on how that level compares with the consumption of others.

One cause of such interdependence has been explored by Veblen (1899) who, referring to the behavior of the *nouveau riche* during the Second Industrial Revolution in Britain, coined the term of "conspicuous consumption". He argued that this consumption "is evidence of wealth, and thus becomes honorific, and . . . failure to consume a mark of demerit." Veblen thus singles out consumption that is intently used as a signal for status. More broadly, conspicuous consumption refers to any consumption activity that is, first, literally "visible" to outsiders, and, second, positional, in the sense that own consumption utility depends partly on relative rather than absolute consumption.

Despite the obvious interest for microeconomic theory (e.g. Layard, 1980, Dupor and Liu, 2003, Arrow and Dasgupta, 2009), and the widespread reference to the concept in the economic literature, there is surprisingly little direct empirical evidence on the effect of conspicuous consumption on well-being of others. The objective of this paper is to contribute such evidence within the context of the life satisfaction literature, in order to provide direct empirical quantifications of the presence and size of consumption externalities. I propose to use information on what people say when asked whether they have a good and worthwhile life, i.e., survey information on "subjective well-being", "satisfaction", or "happiness", in order to estimate the effect of conspicuous consumption on others' satisfaction, and thus the utility loss due to such consumption. The empirical approach using satisfaction equations is in the spirit of previous papers concerned with the valuation of intangibles, including van Praag and Baarsma (2005) on the cost of airport noise, Luechinger (2009) for air quality and Frey et al. (2009) for terrorism.

This paper focuses on a specific instance of conspicuous consumption, the purchase and display of luxury sports cars in Switzerland. Two brands are considered, Ferrari and Porsche. These are (apart from Maserati) the two main automobile producers present in the Swiss market that specialize in the upper segment of luxury sport cars. The demand for these cars has increased over the recent decade. Whereas total sales of new cars declined between 2001 and 2007, the new registrations of Ferraris and Porsches increased by almost 80% (in 2008, the numbers went down, see Figure 1). The consequence was an increase in market share of such luxury sports cars among all newly registered cars from 0.4% in 2001 to 0.8% in 2007.

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The empirical analysis in this paper combines information from various sources. Individual level income satisfaction and other relevant socio-demographic characteristics (most importantly current household income) are obtained from 2002 and 2007 waves of the Swiss Household Panel. Based on the respondent's place of residence, two types of regional information are matched to each

person-year observation. The first, obtained from the Federal Roads Office, provides the number of new luxury car registrations (Ferrari and Porsche per 1000 population and year) in municipality and canton. The second, obtained from the Federal Tax Administration, includes information on average incomes and income inequality, again for each municipality, canton and year.

The statistical hypothesis being tested is that income satisfaction is not correlated with the local or regional density of new luxury sport cars, against the alternative that there is a negative association. Linear regression models provide evidence in support of the alternative. Regression cannot prove causality. In the present context, two instant criticisms come to mind. First, areas with many Ferraris and Porsches are also likely to have more buyers of other expensive cars, or a higher incidence of other displays of wealth (such as luxury condominiums). Without explicitly controlling for these factors, the Ferrari and Porsche density thus proxies for the overall amount of conspicuous consumption, and the effects should not be interpreted as ceteris paribus (keeping other forms of such conspicuous consumption constant) but rather mutatis mutandis. This does not invalidate the general point, though, that the Ferrari and Porsche effect captures the negative externalities from conspicuous consumption.

Second, the Ferrari and Porsche density may pick up some other local area effects that are entirely unrelated to conspicuous consumption. To alleviate this concern, controls for a number of possible confounders, including relative income and income inequality and, exploiting the panel structure of the dataset, time-invariant region specific effects were included. The main result of a negative partial correlation persists, although the effects are estimated with less precision.

2 Background

2.1 Modeling conspicuous car consumption

The following model, an adaptation of Dupor and Liu (2003), provides a useful framework for thinking about conspicuous car consumption. Let c denote own consumption of car attributes (such as horsepower, or looks) and $\bar{c}$ the average attributes in the population of cars. The utility

function of identical consumers can be written as

$$U(c, \bar{c}, x) \tag{1}$$

where x is a non-conspicuous composite good. Suppose that people enjoy horsepower ($\partial U/\partial c = U_1 > 0$, $\partial^2 U/\partial c^2 < 0$) as well as non-conspicuous consumption ($\partial U/\partial x = U_3 > 0$, $\partial^2 U/\partial x^2 < 0$), and that horsepower consumption is conspicuous and generates envy ($\partial U/\partial \bar{c} = U_2 < 0$). People then choose c and x in order to maximize utility subject to the budget constraint

$$c + px \leq y^f$$

where y^f is income at full employment and leisure is part of x. Substituting the constraint into utility function (1), individuals thus maximize

$$U(c, \bar{c}, g(c))$$

where $g(c) = (y^f - c)/p$. They take public consumption $\bar{c}$ as given and trade off the marginal utility from own conspicuous consumption with the marginal utility from non-conspicuous consumption. The first-order condition for a maximum is

$$U_1(c, \bar{c}, g(c)) + g'(c)U_3(c, \bar{c}, g(c)) = 0 \tag{2}$$

or

$$\frac{1}{p} = \frac{U_1(c, \bar{c}, g(c))}{U_3(c, \bar{c}, g(c))} \tag{3}$$

It is a-priori undetermined whether public consumption $\bar{c}$ affects the solution to (3), and hence optimal own consumption levels for c and x. For example, the marginal rate of substitution between conspicuous and non-conspicuous consumption is independent of $\bar{c}$ if the utility function is either additively separable, or multiplicative (e.g. of Cobb-Douglas form) in $\bar{c}$. In these cases, envy has no behavioral consequences although it lowers a person's utility. In other cases, consumption comparisons can lead to behavioral responses. Suppose, for example, that an increase in $\bar{c}$ raises the marginal utility of conspicuous consumption relative to that of non-conspicuous consumption. As

a consequence, it is optimal to increase own conspicuous consumption and reduce non-conspicuous consumption (including leisure, i.e. work more, for example) and the presence of the consumption externality can in principle be inferred from observed behavior.

In general, behavioral data cannot prove the absence of envy effects for the stated reasons. Suppose instead that $U(c, \bar{c}, g(c))$ can be measured empirically. Then it becomes possible to determine the effect of $\bar{c}$ on U, if any, using statistical methods. Learning about such envy effects is important from a policy perspective, as they result in inefficient allocations in general, and "overconsumption" in particular. To see this, note that in a symmetric equilibrium, the following condition must hold:

$$U_1(c, c, g(c)) + g'(c)U_3(c, c, g(c)) = 0$$

This equilibrium with consumption level $\tilde{c}$ is inefficient, since individuals do not account for the negative externality $U_2(c, c, g(c))$ they impose on others. The social optimum requires that

$$U_1(c, c, g(c)) + U_2(c, c, g(c)) + g'(c)U_3(c, c, g(c)) = 0 \tag{4}$$

Assuming concavity of $U(c, c, g(c))$, the optimal car consumption c^* that solves (4) is less than equilibrium consumption $\tilde{c}$, an instance of overconsumption. A government imposing a luxury tax can remove or alleviate this inefficiency.

The underlying assumption of identical consumers is admittedly unrealistic, as every person would then buy cars with similar attributes, whereas in reality Ferraris and Porsches are only bought by few people. Changing the model in order to allow for heterogeneity in endowments (whereby "rich" people would have a greater demand for c) would not change the essential mechanisms leading to overconsumption.

2.2 Empirical literature

Consumption externalities involve two parties: those who generate them and those who are subject to them. There are a number of recent empirical studies regarding the first group of people, i.e., the decision of, and demand for, conspicuous consumption. Johannsson-Stenman and Martinsson

(2006) study the perceived importance of status concerns in consumption decisions. Charles et al. (2009) show that Blacks and Hispanics devote larger shares of their expenditure bundles to visible goods (clothing, jewelry, and cars) than do Whites with similar incomes. This observation is consistent with a simple consumption model where the demand for conspicuous goods is a function of group income. Heffetz (2010) uses the signaling-by-consuming motive to derive and test differential predictions regarding income elasticities of visible and non-visible goods.

In this paper, the focus is on the second of the two parties, namely those subject to the external effects of others' conspicuous consumption. Traditionally, economists have analyzed such externalities (which formally are equivalent to those related, say, to pollution) based on *revealed preferences*, which means by studying changes in behavior. For example, as shown above, an increase in comparison consumption can affect the marginal rate of substitution between consumption of conspicuous and non-conspicuous goods, thereby changing observed choices. Specifically, an increase in reference consumption can lead to an outward shift in labor supply and an increase in own consumption, an effect known as "Keeping up with the Joneses" (Frank, 1999). A well known study along this line is Neumark and Postlewaite (1998) who show that a woman's employment probability increases if the sister's husband's income is greater than the own husband's income. More recently, Kuhn et al. (2010) show that living next to a winner in the Dutch Postcode Lottery increases the level of own car consumption.

However, revealed preference studies may fail to provide evidence for negative consumption externalities if there is pure envy that leaves the margins of choice between conspicuous and non-conspicuous goods unaffected. But even then, other margins of choice beyond those captured by utility function (1) can be affected, for example, the choice where to live. Since conspicuous consumption can be interpreted as a negative neighborhood attribute $\bar{c}$, its effect on U can, in principle, be determined using location decisions (or backed out from housing prices using a hedonic regression).

One alternative to the revealed preference approach is the *stated preference* method. Stated preferences, as elicited in discrete choice experiments (DCE), rely on hypothetical choices. The key

advantage of DCEs over revealed preference studies is that it gives the researcher full freedom and control in manipulating relative positions. In particular, it is possible to include the consumption level of others into the choice set (thereby effectively internalizing it). An example of this approach is the "parallel universe" question, where one has to choose between two fictitious societies, for example one, society A, where everyone lives in a house with 3,000 square feet of floor space, and another one, society B, where the own house has 4,000 square feet while neighbors have 5,000 square feet. Frank (1999, 2004) contents that most people prefer society A. Solnick and Hemenway (1998) have conducted more elaborate discrete choice experiments with real populations. Interestingly, they find that leisure appears to be inconspicuous – perhaps in part because it is not so easily observed by others.

The stated preference and the revealed preference approaches both have their weaknesses. The validity of discrete choice experiments critically hinges upon people's cognitive ability in valuing hypothetical alternatives (and on their truthfulness in responding to such questions). DCEs generate hypothetical choice situations, which may be very far from respondent's actual experiences, and people may decide differently when faced with real choices. The revealed preference approach makes strong assumptions regarding the rationality of agents and the functioning of markets. For example, it is well possible that individuals are not aware of all relevant neighborhood attributes when they make their location decision. For long-term residents, transaction costs may prohibit a relocation in the presence of negative consumption externalities, as long as these costs are sufficiently large.

Given the limitations of the stated and revealed preference approaches, I propose to directly estimate the effect of conspicuous consumption on utility, by using *stated income satisfaction* as a proxy for utility. Recent evidence suggests that satisfaction can be measured with a reasonable degree of reliability, sufficient to be able to compare means over time or across regions, or to use multiple regression analysis to understand the factors that affect individual satisfaction (Krueger and Schkade, 2008). Moreover, satisfaction taps into key components of quality of life. For example, many studies have found a positive correlation between satisfaction, or happiness, and longevity. One of the mechanisms seems to be that satisfaction protects the healthy from becoming sick, by

lowering stress, which in turn enhances the immune system (Veenhoven, 2008). Studies have also shown that individuals who report higher levels of satisfaction with their lives are rated as happier by their relatives and friends, tend to smile more during social interactions, have higher pre-frontal brain activity (the part of the brain associated with positive states), and are more likely to recall positive life events (Layard, 2005).

There is a sizeable literature on the effect of relative income on satisfaction. Studies using survey data (e.g., Clark and Oswald, 1996, Luttmer, 2005, and Dynan and Ravina, 2007) usually find large negative effects of increased reference incomes ceteris paribus, holding own income constant. This evidence provides an explanation of the so called *Easterlin paradox* (Easterlin, 1974) whereby large increases in GDP over time have apparently not led to correspondingly large increases in average satisfaction.

While relative income effects may be related to conspicuous consumption, the connection between the two is not obvious. Unfortunately, direct evidence on the effect of relative consumption on satisfaction is much more sparse, perhaps due to the absence of appropriate data sets. A notable exception is Hsee et al. (2008) who report on evidence from data collected in 31 large cities in China. Participants were asked about their jewelry possessions and their satisfaction with it. The researchers found that residents of cities with more expensive jewelry were not any happier on average about their jewelry than residents of cities with less expensive jewelry (although within each city, people who owned more expensive jewelry reported greater satisfaction with their jewelry).

Hsee et al. (2008) note that while some consumption experiences (such as ambient temperature, having social company etc.) are inherently evaluable and often have a natural scale, others (the size of a diamond, the horsepower of a car) are not, and hence are much more prone to social comparisons. Of course, comparison effects can also relate to past own consumption. There is evidence that hedonic adaptation plays a major role in some consumption activities, such as the size of a house or apartment, but not in others, such as the duration of a commute (Stutzer and Frey, 2008). One factor contributing to the speed of adaptation is uncertainty: unstable or uncertain consumption experiences create longer lasting happiness than their stable and certain equivalents

(Kahneman and Thaler 1991).

3 Data

The empirical analysis combines data from a number of sources: information on individual satisfaction and household income is obtained from the Swiss Household Panel (SHP); car registration data, aggregated to the municipal and cantonal level, were provided by the Federal Roads Office; and information on average incomes and income inequality, again for each municipality and canton, originate from the Swiss Federal Tax Administration. Unfortunately, the years for which the data are available do not precisely match. These are the years 2001 and 2007 for car registrations, and the years 2003 and 2006 for income inequality data. The mismatch is kept at a minimum (plus or minus one year) by choosing 2002 and 2007 as base years and extracting the corresponding person-year observations from the SHP.

The SHP is comparable in structure and scope to other European panel household surveys, such as the German Socio-Economic Panel or the British Household Panel. It was initiated in 1999 and has been repeated annually since (Budowski et al., 2001). Importantly, it collects information on the following question: In general, how satisfied are you with your life if 0 means "not at all satisfied" and 10 means "completely satisfied"? In addition, there are questions on satisfaction with a number of life domains, including satisfaction with income. In this paper, I focus on income satisfaction, henceforth referred to as "satisfaction" for the sake of brevity. The SHP also provides information on many of the control variables typically used in satisfaction regressions. These include household income, household size, age, marital status, employment status, gender and language region. Depending on year, there are between 4000 and 5000 person observations with complete information on the relevant variables.

An innovation of this paper is the augmentation of the SHP data with regional information on cars, mean incomes and income inequality. Two levels of regional aggregation are considered, the municipality and the canton. Switzerland is composed of about 2,900 municipalities. According to

the population census of 2000, they range in size from 24 inhabitants (Corippo in the Verzasca Vally in Ticino) to 368,875 inhabitants (Zurich). A total of 1,053 municipalities are represented among participants of the Swiss Household Panel. Switzerland is a confederation of 26 cantons whose role and political functions closely resemble that of the States within the U.S.; Again, population sizes vary considerably, from a mere 15,199 in the canton of Appenzell Innerrhoden to 1.3 million in the canton of Zurich.

Exposure to conspicuous car consumption is defined by the number of newly registered Ferrari and Porsche cars per year per 1000 population in the municipality or canton the individual resides in. We refer to this number from now on as "FP-ratio". In 2001, the FP-ratio varied between 0 and 7 at the municipal level and between 0.09 (canton of Berne) and 0.65 (canton of Zug) at the cantonal level. Over the whole of Switzerland, a total of 1,459 Ferrari and Porsche cars was newly registered during the year 2001, corresponding to an FP-ratio of about 0.20 per 1000 population.

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By 2007, the nationwide number of new registrations of Ferraris and Porsches had increased substantially. The "least conspicuous" canton (with a rate of 0.08) was now the canton of Glarus. In Zug, again the canton with by far the highest density of such new sport cars, the number had almost doubled to 1.27. It has to be pointed out that the number of newly registered cars may not be the best measure for conspicuous car consumption, as it measured the flow rather than the stock of such cars. Unfortunately, stock data are not kept on file by the Federal Roads Office. In the steady state, the stock is proportional to the flow.

Income inequality data stem from the Swiss Federal Tax Administration (Jeitziner and Peters, 2007). The SFTA publishes Gini coefficients for all municipalities and cantons of Switzerland, as well as mean income, median income and number of people living in every municipality, for selected tax years. Every Swiss resident with income has to file an annual tax return. Taxable income includes income from all sources (mainly labor earnings, interest and rental income) but

excludes social security contributions (retirement and unemployment insurance). The income of jointly declaring couples is divided evenly. The resulting Gini coefficient measures personal income inequality *before* taxes. This is not ideal, since utility is usually derived from disposable income, and many of the channels discussed in the previous section (including reference incomes, altruism and uncertainty) are more appropriately thought of in terms of post-tax income. However, pre- and post-tax Gini coefficients tend to be highly correlated.

After merging the SHP data with the indicators for conspicuous consumption, mean income and income inequality, and restricting the sample to those aged between 20 and 70 with non-missing responses on the key variables, there are 8,795 observations 3,797 for the year 2002 and 4,988 for the year 2007. The increase in the sample size is explained by a refreshment sample drawn in 2004. Table 1 shows the descriptive statistics for the final dataset.

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We see that mean satisfaction decreased between 2002 and 2007, from 7.20 to 7.03 on the 0-10 scale. This change is statistically significant. Among the potential contributing factors, the increase in the FP-ratio – from 0.24 to 0.30 at the municipal level, and from 0.24 to 0.33 at the canton level – is the most "conspicuous" (these FP-ratio means are weighted by the regional SHP population distribution, which explains the discrepancy with the Swiss-wide ratios mentioned earlier). Inequality increased also somewhat, as did average age and the income variables. Whether the correlation between mean satisfaction and the FP-ratio over time is just that, a correlation, or else possibly an effect with causal interpretation will be investigated in the next section by means of an extended regression analysis.

4 Empirical Models and Results

The effect of conspicuous consumption on income satisfaction is estimated by exploiting variation in the density of Ferraris and Porsches across region and time. Are those who live in a municipality

or canton with relatively more such luxury cars, or where the ratio increased most, less satisfied than others, and if so, how large is the effect of conspicuous consumption on well-being on others? We would like to estimate the effect "all else equal", and therefore use regression analysis to account for potential confounders. Among them, income is perhaps the most important variable to include, since it is, first, a proxy for own consumption, and, second, a natural monetary comparison scale in order to gauge the magnitude of the consumption externalities. Income is defined as annual disposable household income, i.e., net of taxes and including all transfers.

Other controls are the usual individual socio-demographic variables, an income comparison term (an indicator variable that takes the value 'one' if own income is above mean regional income, and the value 'zero' else), and finally region fixed effects. The panel is highly unbalanced, as less than one third of all persons (2065) are included in both years. For this reason, I report regression estimates with municipality and canton, rather than individual, specific effects. Estimated standard errors are corrected for individual level clustering.

Moreover, the models are estimated with and without controlling for the (logarithm of the) regional income Gini coefficient. It is clear that income inequality and conspicuous consumption are closely related. People might have negative feelings about income inequality per se (Alesina et al., 2004, Winkelmann and Winkelmann, 2010). Without controlling for income inequality, it is hard to say whether the effect of FP-ratio captures genuine conspicuous consumption, or inequality aversion more broadly. By controlling for income inequality, the specific consumption externality can be isolated, at least in principle. The question is then whether, for a given level of inequality, people's income satisfaction depends on the way the money is spent, namely more or less conspicuously.

Table 2 displays results for the municipality based analysis, Table 3 the results for the canton based analysis. There are two sets of three regressions each, the first three without regional fixed effects included, the second with the regional fixed effects. Among the three regressions in each part, a first controls only for the FP-ratio, the second only for the logarithmic Gini, and the third

for both.

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Table 2 reproduces standard estimates for the effects of control variables on satisfaction. The coefficients tend to be quite robust across the six model specifications. The own income effect is close to unity and highly significant. An increase of household income by ten percent is thus predicted to increase satisfaction by 0.1. Evaluated at mean satisfaction of about 7, this corresponds to an income elasticity of 0.14. The evidence is consistent with the relative income hypothesis, as, for a given own income, people are more satisfied if their income exceeds the regional mean income. In addition, married people are more satisfied than unmarried ones, satisfaction is u-shaped in age, women are more satisfied than men and, a large effect, unemployed persons are less satisfied than employed persons (Winkelmann and Winkelmann, 1998).

The key parameter of interest is the estimated coefficient of the FP-ratio variable. In the model without Gini and without regional fixed effect, the point estimate is -0.094 and statistically significant at the 5% level. In words, one additional Ferrari or Porsche per thousand population (or 17 additional cars for the municipality size of the average person in the sample) lowers income satisfaction by about the same amount as a 10% reduction in household income. One additional car is about the difference between the least conspicuous and the most conspicuous canton in 2007. For an alternative perspective, take the 2001 figure of 0.20 Ferraris and Porsches per thousand inhabitants in Switzerland. Doubling that rate would, according to the estimate, have an adverse effect on mean income satisfaction that is equal to that of a 2 percent reduction in income.

When the logarithmic Gini is included instead of the FP-ratio, we find a negative effect as well, but it is no longer statistically significant. When both Gini and FP-ratio are included in a horse race regression, the FP-ratio effect remains virtually unchanged (about -0.1) and significant, the logarithmic Gini has no explanatory power. This finding suggests that the effects of inequality on well-being are intricately linked to the way the well-to-do spend their money.

Once region specific effects are included, the point estimates of the FP-ratio variable remain very similar (about -0.12), but the precision suffers as expected, as the number of degrees-of-freedom is reduced by more than one thousand. As a consequence, the effects are no longer statistically significant. This raises the question whether an analysis based on cantons is to be prefered, as it makes a more economical use of the data. Clearly, canton fixed effects do not reduce the degrees-of-freedom by as much. On the other hand, cantons might be to coarse a division to appropriately capture putative consumption externalities of luxury sport cars. The results for cantons are shown in Table 3, which otherwise is structured in the same way as Table 2.

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It turns out that the FP-ratio effects are actually larger than before. The point estimates range between -0.24 and -0.60. They are statistically significant without controlling for the Gini, but turn insignificant once both inequality measures are included. Apparently, the high correlation between the two measures (0.72 in 2002 and 0.85 in 2007) renders it difficult to identify the specific effects. The direct effect of the Gini tends to be larger in the canton-based models than in the municipality based models. A possible explanation is reduced measurement error at this higher level of aggregation.

An additional robustness check is reported in Table 4. Specifically, the models are re-estimated for the sub-population of individuals with below average incomes, using the municipality based specification. The sample size is reduced to 4350 observations. One might expect that this group of people is more strongly affected by inequality in general, and perhaps also by conspicuous car consumption, than others. And indeed, the evidence supports this conjecture. The FP effects now range between -0.17 and -0.26, depending on specification. Importantly, the effects are always statistically significant, also when including regional fixed effects. When both Gini and FP-ratio

are included, it is the FP-ratio that is statistically significant while the Gini is not.

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Overall, the results are suggestive of negative effects of conspicuous consumption on satisfaction. For the full sample, the canton level FP-ratio coefficient is statistically significant even when controlling for regional effects. For people in the lower half of the income distribution, the FP-ratio coefficient is statistically significant in all specifications. Moreover, while the estimates are associated with a considerable amount of uncertainty, and their magnitudes depend somewhat on specification, the signs are always negative, and the implied compensating income variations are substantial. It is perhaps premature to draw specific policy conclusions from these results. The empirical investigation in this section suggests, however, that consumption externalities caused by envy are an empirically relevant phenomenon that can usefully be studied with satisfaction equations.

5 Conclusions

The first objective of this paper was to explore the life satisfaction approach as a conceptual framework for thinking about conspicuous consumption and consumption externalities. The traditional tools of welfare analysis identify externalities from behavioral responses. This limits the scope of questions one can answer. It is for example difficult to quantify the welfare loss resulting from envy-related overconsumption, or to quantify the disutility of an externality, or the utility of a public good, more broadly. To value such intangibles, the satisfaction approach offers a promising alternative.

The second objective was to conduct a substantive empirical analysis for Switzerland and to determine the welfare costs of luxury sport cars. The results indicated that people living in an area with a higher prevalence of luxury cars are indeed less satisfied, ceteris paribus. Doubling the number of Ferraris and Porsche is estimated to have an adverse effect on mean satisfaction that

is at least as large as that of a 2 percent reduction in income. The cost is substantially larger for those in the bottom half of the income distribution.

While the focus of the paper was on Ferraris and Porsche, this was due to budgetary reasons: the data are proprietary and needed to be purchased on a case by case basis, and funding for a wider analysis was not available. One would expect that similar results would be obtained if other luxury cars brands had been used for the analysis, or, for example all cars whose price exceeds a certain threshold amount, or, indeed, other consumption items that have a reputation for signaling wealth and status. As such, the Ferrari and Porsche measure should be seen as a proxy for conspicuous consumption more widely defined. The basic assumption is that the more Ferraris and Porsches there are in the municipality or canton, the higher the incidence of conspicuous consumption, whatever its specific manifestation.

In 2009, an "initiative for human friendly cars" was successful in collecting a sufficient number of signatures, so that a referendum must be put to the people in Switzerland in due course. The initiative proposes restrictions on the type of cars sold, and imposes additional luxury taxes for certain classes of vehicles. While the proponents of the initiative argued mostly in terms of environmental damage and traffic safety, the results of this paper provide another potential argument in support of the proposed policy measures, namely using taxes in order to internalize the cost of an externality. While it is unlikely that this initiative will in the end find the support of a majority of the electorate, the public discussion highlights the controversial perceptions of such cars in Switzerland.

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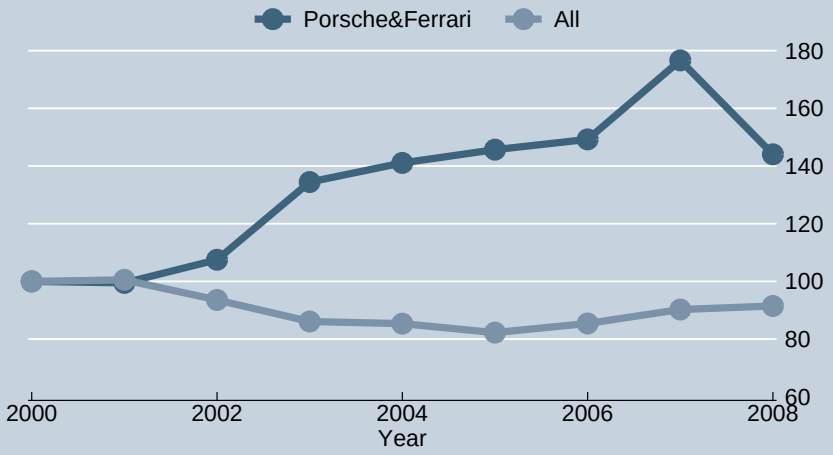
Table 1
Descriptive Statistics

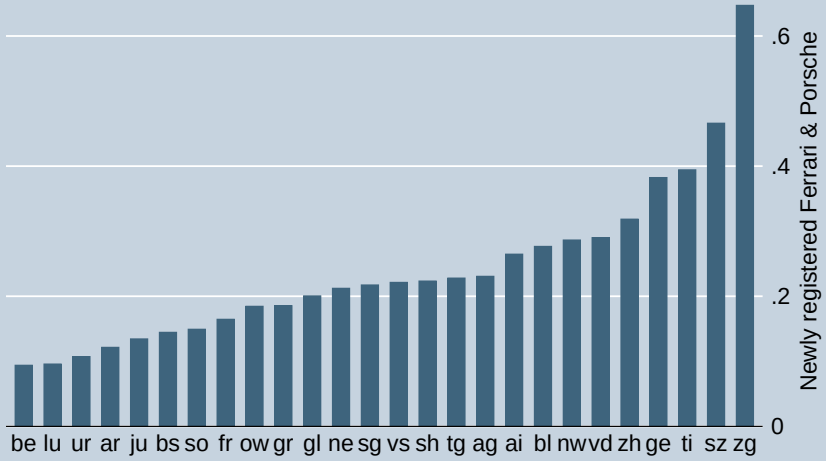
	Year 2002		Year 2007	
	mean	std.err.	mean	std.err.
Income Satisfaction	7.20	(0.032)	7.03	(0.030)
Household size	3.02	(0.023)	2.86	(0.019)
Log household income	10.87	(0.008)	10.97	(0.007)
Age	44.36	(0.204)	45.73	(0.187)
Married (Yes=1)	0.668	(0.008)	0.609	(0.007)
Romandie (Yes=1)	0.280	(0.007)	0.254	(0.006)
Unemployed (Yes=1)	0.019	(0.002)	0.015	(0.002)
Employed (Yes=1)	0.764	(0.007)	0.794	(0.006)
Male (Yes=1)	0.451	(0.008)	0.447	(0.007)
Population size	16892	(641)	17584	(580)
Ferrari&Porsche/1000 pop. (munic.)	0.240	(0.006)	0.303	(0.009)
Ferrari&Porsche/1000 pop. (canton)	0.240	(0.002)	0.330	(0.003)
Gini (munic.)	0.287	(0.001)	0.294	(0.001)
Gini (canton)	0.306	(0.001)	0.316	(0.001)
Mean income (munic.)	10.84	(0.003)	10.89	(0.003)
Mean income (canton)	10.86	(0.002)	10.91	(0.002)
Number of observations	3797		4988	

Fig. 1. Index of New Car Registrations in Switzerland (2000=100)



Source: www.auto−schweiz.ch

Fig. 2. Cantonal ranking in luxury car registrations per 1000 pop., 2001



Source: Federal Roads Office, own calculations.

Table 2
Income Satisfaction, Inequality and Luxury Cars in Municipality
OLS results (n = 8691)

Log household income	0.957**	0.951**	0.955**	1.054**	1.057**	1.055**
	(0.068)	(0.071)	(0.071)	(0.082)	(0.082)	(0.082)
Income above municipal mean	0.240**	0.248**	0.242**	0.161**	0.158**	0.160**
	(0.062)	(0.065)	(0.065)	(0.076)	(0.076)	(0.076)
Ferrari&Porsche/1000 pop.	-0.094**		-0.097**	-0.123		-0.120
in municipality	(0.043)		(0.047)	(0.084)		(0.084)
Log municipal Gini		-0.104	0.020		-0.473	-0.399
		(0.126)	(0.137)		(0.620)	(0.618)
Log household size	0.112*	0.110*	0.113*	0.118*	0.117*	0.117*
	(0.060)	(0.060)	(0.060)	(0.069)	(0.069)	(0.069)
Married (Yes=1)	0.437**	0.436**	0.437**	0.347**	0.346**	0.347**
	(0.064)	(0.064)	(0.064)	(0.073)	(0.073)	(0.073)
Age	-0.012	-0.012	-0.012	-0.009	-0.009	-0.009
	(0.012)	(0.012)	(0.012)	(0.013)	(0.014)	(0.014)
$Age^2/100$	0.036**	0.036**	0.036**	0.032**	0.032**	0.032**
	(0.013)	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)
Romandie (Yes=1)	-0.489**	-0.490**	-0.490**	-0.876**	-0.873**	-0.875**
	(0.052)	(0.052)	(0.052)	(0.196)	(0.197)	(0.196)
Unemployed (Yes=1)	-1.748**	-1.746**	-1.749**	-1.692**	-1.691**	-1.691**
	(0.231)	(0.232)	(0.232)	(0.257)	(0.257)	(0.257)
Male (Yes=1)	-0.263**	-0.263**	-0.263**	-0.229**	-0.230**	-0.230**
	(0.045)	(0.045)	(0.045)	(0.043)	(0.043)	(0.043)
Year 2007	-0.280**	-0.284**	-0.280**	-0.273**	-0.270**	-0.263**
	(0.038)	(0.038)	(0.038)	(0.048)	(0.050)	(0.050)
R-squared	0.140	0.140	0.140	0.309	0.309	0.309
Munic. fixed effects	no	no	no	yes	yes	yes

Notes:
Robust standard errors (adjusted for multi-person observations) in parentheses
* p< 0.10, ** p< 0.05

Table 3
Income Satisfaction, Inequality and Luxury Cars in Canton
OLS results (n = 8691)

Log household income	0.918**	0.921**	0.922**	0.959**	0.957**	0.958**
	(0.072)	(0.072)	(0.073)	(0.074)	(0.074)	(0.074)
Income above canton mean	0.282**	0.281**	0.279**	0.247**	0.251**	0.248**
	(0.066)	(0.066)	(0.066)	(0.068)	(0.068)	(0.068)
Ferrari&Porsche/1000 pop.	-0.241*		-0.108	-0.602**		-0.466
in canton	(0.127)		(0.206)	(0.303)		(0.331)
Log canton Gini		-0.333*	-0.217		-1.506	-1.016
		(0.172)	(0.280)		(0.928)	(1.013)
Log household size	0.121**	0.121**	0.121**	0.107*	0.108*	0.107*
	(0.059)	(0.059)	(0.059)	(0.057)	(0.057)	(0.057)
Married (Yes=1)	0.435**	0.433**	0.434**	0.431**	0.430**	0.430**
	(0.064)	(0.064)	(0.064)	(0.061)	(0.061)	(0.061)
Age	-0.012	-0.012	-0.012	-0.013	-0.013	-0.013
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
$Age^2/100$	0.037**	0.037**	0.037**	0.038**	0.038**	0.038**
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Romandie (Yes=1)	-0.487**	-0.477**	-0.479**	-0.664**	-0.660**	-0.662**
	(0.052)	(0.053)	(0.053)	(0.109)	(0.109)	(0.109)
Unemployed (Yes=1)	-1.749**	-1.749**	-1.748**	-1.734**	-1.732**	-1.735**
	(0.232)	(0.232)	(0.232)	(0.232)	(0.232)	(0.232)
Male (Yes=1)	-0.262**	-0.262**	-0.262**	-0.263**	-0.263**	-0.263**
	(0.045)	(0.045)	(0.045)	(0.042)	(0.042)	(0.042)
Year 2007	-0.261**	-0.273**	-0.267**	-0.226**	-0.236**	-0.208**
	(0.039)	(0.038)	(0.040)	(0.051)	(0.050)	(0.053)
R-squared	0.141	0.141	0.141	0.146	0.146	0.146
Canton fixed effects	no	no	no	yes	yes	yes

Notes: see Table 2

Table 4
Income Satisfaction of people in lower half of income distribution
OLS results (n = 4350)

Log household income	1.115**	1.119**	1.115**	1.159**	1.150**	1.156**
	(0.129)	(0.129)	(0.129)	(0.173)	(0.173)	(0.173)
Ferrari&Porsche/1000 pop.	-0.170**		-0.176**	-0.280*		-0.267*
in municipality	(0.067)		(0.072)	(0.148)		(0.146)
Log municipal Gini		-0.188	0.036		-1.230	-1.004
		(0.182)	(0.197)		(1.089)	(1.090)
Log household size	0.211**	0.200**	0.212**	0.151	0.150	0.151
	(0.094)	(0.094)	(0.094)	(0.126)	(0.126)	(0.126)
Married (Yes=1)	0.599**	0.599**	0.600**	0.464**	0.465**	0.464**
	(0.105)	(0.105)	(0.105)	(0.134)	(0.135)	(0.134)
Age	-0.045**	-0.046**	-0.045**	-0.049**	-0.049**	-0.049**
	(0.019)	(0.019)	(0.019)	(0.023)	(0.023)	(0.023)
$Age^2/100$	0.073**	0.074**	0.073**	0.073**	0.074**	0.073**
	(0.021)	(0.021)	(0.021)	(0.025)	(0.025)	(0.025)
Romandie (Yes=1)	-0.471**	-0.471**	-0.472**	-0.808**	-0.794**	-0.808**
	(0.077)	(0.077)	(0.077)	(0.339)	(0.340)	(0.339)
Unemployed (Yes=1)	-1.806**	-1.803**	-1.806**	-1.758**	-1.759**	-1.759**
	(0.295)	(0.294)	(0.295)	(0.360)	(0.359)	(0.360)
Male (Yes=1)	-0.234**	-0.233**	-0.234**	-0.180**	-0.180**	-0.181**
	(0.069)	(0.069)	(0.069)	(0.071)	(0.071)	(0.071)
Year 2007	-0.287**	-0.296**	-0.287**	-0.282**	-0.278**	-0.259**
	(0.060)	(0.060)	(0.060)	(0.081)	(0.083)	(0.084)
R-squared	0.101	0.099	0.101	0.349	0.349	0.349
Municipal fixed effects	no	no	no	yes	yes	yes

Notes: see Table 2