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# From average Joe to frugal Jane and wasteful John: A quantile regression analysis of Swiss households' electricity use

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# From Average Joe to Frugal Jane and Wasteful John: a Quantile Regression Analysis of Swiss Households' Electricity Use[1]

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## Abstract

In this article, we investigate the heterogeneity in household electricity demand in Switzerland. We use a quantile regression approach in order to assess the impacts of electricity prices, income and other socio-demographic characteristics across consumer groups with increasing energy intensities. Estimations show important differences between the "average Joe", the "frugal Jane" and the "wasteful John" for the majority of these variables. Most importantly, households in the lowest deciles of electricity use do not react to changes in electricity prices, while those situated at upper-end of the electricity spectrum exhibit significantly negative short-run price elasticities varying between -0.16, -0.19, -0.21 and -0.27 at the at the 6th, 7th, 8th and 9th deciles, respectively. We also find that low users of electricity react positively and significantly to changes in their wealth compared to intensive electricity consumers. The main policy implications of this work concern the design of price-based measures for reducing electricity consumption in the residential sector and the possibility of accounting for individual responses in tailoring policies, governance mechanisms and business models.

**Keywords:** Heterogeneity; Quantile regression; Households; Electricity; Electricity prices; Switzerland

**JEL classification:** Q400; Q410; D120.

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[1] This research is part of the activities of SCCER CREST, which is financially supported by the Swiss Commission for Technology and Innovation (CTI). The title of this article draws on an earlier article by Binder & Coad (2011). Any resemblance with actual persons is purely fortuitous.

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## 1. Introduction

The notion of "the average economic agent", "the representative consumer" or "the typical household" plays a central role in applied economics. It is used to aggregate population attributes into a single representative entity in order to measure its responsiveness to changes in its characteristics or environment. Although bringing computational and interpretational convenience, and usually being related to lower policy-implementation costs, the "representative customer" is likely to conceal some important heterogeneity among individuals in the population under study. If this is the case, "one-fits-all" policy interventions based on the reactivity of the "average Joe" could penalize those individuals who expose different consumption behaviors, and hence have a nil, or at worse counter-productive effects for these population groups. Therefore, *"Applied economists increasingly want to know what is happening to an entire distribution, to the relative winners and losers, as well to averages"* (Angrist & Pischke, 2009, p.267).

Research in the domain of residential energy use has repeatedly assessed the impact of prices or income variations on the energy requirements of an average household. However, the impact of the changes in these variables may differ between the typical energy consumer ("the average Joe"), the parsimonious one ("frugal Jane") and the intensive one ("wasteful John"), especially if their levels of consumption are characterized by sharp contrasts. If addressing consumer heterogeneity through consumer segmentation, for example, is commonplace in marketing studies (see for example Klöckner, 2015), variability in the domain of household energy demand has received relatively little attention in practice[4], despite being acknowledged as significant (Jaffe & Stavins, 1994; Lindén et al., 2006; Randolph, 2008). In fact, a major part of the research in the field of residential electricity requirements employs standard regression analysis practices which focus on changes in the conditional mean of the distribution of electricity consumption, as a response to different socio-economic and socio-demographic covariates (e.g., Alberini et al. (2011), Brounen et al. (2012), Kavousian et al. (2013) Sanquist et al. (2012)). Yet, as pointed out by Cade & Noon (2003) and Randolph

[4] See for instance Cayla & Maïzi (2015), Hendricks & Koenker (1992), Kaza (2010), Reiss & White (2005), Sardianou (2008), Waechter et al., (2015), Willis et al. (2011).

(2008), methods, such as OLS, applied to heterogeneous distributions of the outcome variable may severely under- or overestimate the effect of a given determinant, or even fail to detect its impact, and therefore lead to suspect overall results. Also, previous findings about the average effect of income and price elasticities have been qualified as "mixed" and "inconclusive", or exhibit important degree of variation (Espey & Espey, 2004; Fan & Hyndman, 2011; Sanquist et al., 2012) - a fact that might be due among other things namely to unobserved population heterogeneity.

A more informative and complete picture going beyond the average relationship between a given response variable and its determinants, is provided by the quantile approach developped by Koenker & Bassett (1978). Quantile regression - a powerful tool providing the possibility of readily assessing the influence of different factors over the entire spectrum of an outcome variable - has been applied by several authors in the study of residential energy consumption. For instance, Kaza (2010) focuses on dwelling and geographic characteristics, and finds that housing type, size and neighborhood density have substantially different impacts at the tails of the distribution of household energy demand in the US, compared to the conditional average. Although this work addresses primarily space heating and cooling, the author also considers the energy used by appliances and for warm water where the use of electricity might be supposed predominant. In this group, he observes that prices have a stronger impact at the upper spectrum of the distribution, but the discussion of these results, as well as of the influence of income is not pursued any further. In his study of residential heating demand in Greece, Sardianou (2008) similarly uses a quantile analysis among other standard regression techniques. Her results reveal that income plays a significant, albeit not different role for high and low heating consumers. The effect of energy prices is measured indirectly through households' willingness to restrict heating fuel consumption in case of a fuel price increase. The author concludes that intensive heating consumers are less inclined to reduce their energy use, compared to more frugal households. If it concerns residential electricity consumption, Hendricks & Koenker (1992) investigate the electricity demand of households in Chicago in the context of testing nonparametric models for conditional quantiles. Using socio-demographic and dwelling attributes as explanatory variables and controlling for the

possession of various electronic durables, they find that lower quantiles of demand exhibit low variation across households, whereas the upper ones are significantly influenced by household characteristics and appliance ownership. Beyond the quantile regression method, substantial heterogeneity in the residential use of electricity has been observed by Reiss & White (2005) who model electricity demand according to several groups of electronic appliances, depending on their energy intensities. These categories are characterized by significantly different price sensitivities, with the largest impacts being observed in the highest intensity groups (e.g. swimming pool), and with negligible and insignificant effect of income on the electricity use in each group. These findings are nevertheless closely related to the basic concept underlying quantile regression. Indeed, since quantiles of electricity consumption represent intensities of demand, just as the grouping of different types of electronic durables in Reiss and White's paper, a quantile approach could be well-suited for the analysis of variability in household electricity use.

In this article we set to explore the heterogeneity in residential electricity demand in Switzerland, where household energy use represents a substantial and constant share of about 30% in final energy requirements (and about 40% of total electricity production) (BfE/OFEN, 2017), and is thus one of the main targets of the country's is ambitious *Energy Strategy 2050* (OFEN & SFC, 2013). In particular, our goal is to assess the impact of income and electricity prices across different groups of households defined by the intensity of their electricity consumption. For these purposes we apply the method of quantile regression (Koenker & Bassett, 1978). We use pooled cross-sectional data from the three latest waves of the Swiss Household Energy Demand Survey (SHEDS) (Weber et al., 2017) and price data from the Swiss the Swiss Federal Electricity Commission (ElCom). Results suggest that intensive electricity users are sensitive to changes in prices, compared to households situated at the lower end of the spectrum of electricity consumption. The resulting short-run price elasticities which fall in the lower range estimated by previous studies for various countries including Switzerland (Alberini et al., 2011; Boogen, Datta, & Filippini, 2017; Espey & Espey, 2004; Fan & Hyndman, 2011; Filippini, 2011). Although, we observe that households at the $90^{th}$ percentile of the electricity distribution are significantly more sensitive (-0.27) to changes in income compared to

households in the 60th percentile (-0.16) of our sample, standard t-tests do not allow us to reject the hypothesis of no difference between these coefficients. The price sensitivity of the "average household" (-0.18) obtained from OLS thus seems to reflect the upper tail of the electricity demand distribution. In addition, we observe that income and dwelling ownership, which can be both considered as more general proxies for household affluence, have a positive effect on electricity use in the lowest decile of the distribution of the response variable and a negative, yet insignificant effect at the highest deciles. These results suggest that "one-fits-all" price policies may penalize price-inelastic users, who represent more than half of the population, without inducing them to reduce their energy requirements, unless this measure is coupled with a subsidy for less-intensive electricity users. On the other hand an increase in energy prices is particularly suited for high electricity consumers, but will have a limited impact on overall electricity use.

This article is organized as follows. The next section briefly presents and discusses the method of quantile regression and additional estimation issues, such as price endogeneity and sampling strategy. Section 3 introduces the datasets used in this analysis. The results from our estimations, comparisons with OLS are discussed in detail in the ensuing section 4, while section 5 concludes.

## 2. Econometric approach[5]

Traditionally, conditional mean regression analyses investigate the "average" impact of various sets of covariates on a given response variable. Yet, in many cases the distribution of the dependent measure might be strongly skewed, thus putting into perspective the concept of a "typical household". As early as 1977, Mosteller & Tukey (1977) remark that *"What the regression curve does is give a grand symmetry for the averages of the distributions corresponding to the set of x's. We could go further and compute several regression curves corresponding to the various percentage points of the distributions and thus get a more complete picture of the set. Ordinarily this is not done, and so regression often gives a rather incomplete picture. Just as the means gives an incomplete picture of a single distribution, so the regression curve gives*

[5] This section draws on Koenker & Bassett (1978), Angrist & Pischke (2009), Binder & Coad (2011), Kaza (2010**)** and Cameron & Trivedi (2009).

*a correspondingly incomplete picture for a set of distributions."* (p.266). Kaza (2010) explains that simply choosing a sub-sample of intensive consumers in order to explore the effect of different covariates is not a good strategy in practice, because it might entail a sampling bias, as initially suggested by Heckman (1979). Instead, the quantile regression (QR) approach developed by Koenker & Bassett (1978) considers the entire distribution of the response variable by attributing greater weights to the observations in the percentile we are interested in. To see this, let's consider as starting point the following basic regression model:

$$y_i = x_i' \beta + e_i \ , \tag{1}$$

where $y_i$ is the dependent variable of interest - in our case the demand of electricity in kWh by a given household $i$, $x$ is a vector of explanatory variables consisting of household income, electricity prices, electronic durables, socio-demographic, dwelling and psychological characteristics, and $e_i$ is the error term. In the case of OLS, the standard estimation procedure minimizes the sum of the square of the error terms $\sum_i e_i^2$, whereas in the best-known case of conditional QR called median regression (also known as least-absolute deviation regression), one minimizes the absolute sum of residuals $\sum_i |e_i|$. In that latter case the vector of coefficients $\beta$ is noted as $\beta_q$ , where $q = 0.5$ indicates the 5th decile of $y_i$ 's distribution, that is the middle value of the ranked electricity consumption. This last treatment of the residuals is a specific case of the minimization of the more general expression $\sum_i q \ |e_i| + \sum_i (q-1) \ |e_i|$ , where $0 \leq q \leq 1$ also called the "check function" or "the asymmetric loss function" which gives $q$ weights (also called asymmetric penalties) to observations, depending on their position with respect to the best line of fit. Thus, when $q = 10$, all the observations below the 10th quantile of the response variable are assigned a weight nine times higher than those above it, which explains the notion of "asymmetric loss".

Conditional QR has several advantages over OLS. The first one is that unlike standard OLS where the normality of the residuals is assumed, QR does not make any specific assumption about the distribution of the regression errors. For this reason, and because the estimated coefficients of conditional QR are non-stochastic, this approach is qualified as semiparametric. QR is also less sensitive to extreme data points than

OLS (analogically to a comparison between a mean and a median value) and is therefore more efficient. Secondly and most importantly, QR provides estimations of the impact of various covariates for the entire distribution of the dependent variable, thus drawing specific conclusions about *different* consumption groups. Thirdly, QR is equivariant to monotone transformations, meaning that if one estimates the effect of a variable $z_i$ on the response variable $y_i$ which is measured on a logarithmic scale, but for prediction purposes needs to estimate the effect of $z_i$ on the original dependent variable $y_i$ in levels, an inverse transformation is possible and easily applicable. Finally, quantile regression allows a ready interpretation of the estimated coefficients $\beta_q$ as marginal effects. Nevertheless, it should be stressed that in that case, first, marginal effects translate only infinitesimal changes in regressors in order to keep the dependent variable in the same quantile; and second, conditional marginal effects should be interpreted within their respective quantiles (Angrist & Pischke, 2009).

Similarly to Binder & Coad (2011), in this article we use pooled data, despite the fact that longitudinal data is available. Hence, our goal is to focus on cross-sectional differences, that is, on heterogeneity between households, as suggested in the title, rather than temporal differences tracing the evolution of households' responsiveness in a given quantile over time. However, the use of pooled panel data might be problematic for the estimation of our model, for the replicability of observations over time makes them dependent and not identically distributed, thus presenting a potential problem of autocorrelation between the error terms. Yet, our results are confirmed when the initial sample of time-duplicate household is limited to non-repeating observations only. Since the choice of the period at which a given observation is kept is completely random, we can test the robustness of our results with many alternative samples. Applying our model to these varying pooled cross-sectional samples reaffirms that using pooled panel data is in this case not problematic.

A second estimation issue is related to the fact that electricity prices are spurious by construction. This is due to the fact that the amount of electricity consumed by household is itself used to assigns customers to a given price category defined by the ElCom. Because all suppliers in Switzerland impose a fixed service

charge, households with higher usage of electricity pay thus lower prices. In order to deal with endogeneity, we use median grid access costs at the municipality level as a proxy[6] for actual electricity prices. Differences between the grid tariffs of different municipalities translate topography-related maintenance and production costs which are exogenous to the amount of residential electricity consumption.

Finally, it should be noticed that our estimation strategy applies to the short run, where the stock of electricity-using durables is considered fixed (exogenous to electricity usage). That is, given the stock of appliances, households only decide whether to reduce or increase their electricity usage. In contrast, as noted by Reiss & White (2005), on the long run both the change in utilization habits and the stock of electronic devices possessed by a given household can vary. Under these considerations, we estimate the short-term impact of income, electricity prices, sociodemographic, dwelling and psychological characteristics for ten percentiles of electricity consumption simultaneously, relying on bootstrapped standard errors for more robust results.

## 3. Data and descriptives

### 3.1 Datasets

The analysis presented in this article relies on a pooled cross-sectional dataset of Swiss households surveyed online in three consecutive years, from 2016 to 2018, thus covering their electricity demand between 2015 and 2017. The dataset, known as the Swiss Household Energy Demand Survey (SHEDS), is created by the joint effort of several Swiss research institutions and is financed by the Swiss national Commission for Technology and Innovation (Weber et al., 2017). The SHEDS covers the entire geographical space of Switzerland, except the canton of Ticino, and is conceived as a rolling panel dataset consisting of about 5,000 respondents per wave. Its main objective is to collect rich information on Swiss household's energy consumption behaviors from an economic, sociological and psychological perspectives. For this purpose,

[6] The use of a proxy or an instrumental variable (IV) are two alternative methods to address endogeneity. For computational convenience, hereafter we use the former method, which instead of applying a two-stage-least squares procedure applied in an IV estimation, directly uses the "instrument" as a proxy of the endogenous regressor.

the SHEDS questionnaire includes several modules such as space heating (including warm water), electricity and private mobility usage, socio-economic and dwelling characteristics, psychological attitudes, habits and routines, and also implements various experimental designs. Household members aged 18 years old or more, and at least partially responsible for the household, are interviewed about their energy usage and behaviors during the one-year period prior to the survey. The SHEDS dataset has been previously used in research by Hille et al. (2017) and Blasch et al. (2017).

In addition to the SHEDS dataset, we use price data for three years (2015 to 2017) from the Swiss Federal Electricity Commission (ElCom) provided at the utility level. Prices are averaged over the time-of-day usage, the seasonal tariff and the specific type of tariff (green or standard) chosen by households[7]. Eight price categories are defined according to several dwelling attributes, such as the possession of specific electronic durables, the number of rooms in the dwelling and its type. For instance, a household living in a detached house with five rooms and in a possession of an electric stove, boiler and dryer falls in the fifth price category. Since these features are also available in the SHEDS, we are able to match households with their local electricity providers based on the zip codes of their homes and the specific survey year. However, not all households correspond to the profiles defined by the ElCom. This is the case for those living in three-room apartments and many households living in detached dwellings. In the former case, and following the explanations provided to us by ElCom, we define an additional ninth category taking the average price of apartments with two and four rooms, whereas in the latter we assign an average price of all existing categories.

### 3.2 Dependent measure [8]

We use the logarithm of annual electricity use (kWh) of households as response variable in our QR model. Households who do not report electricity consumption in kWh from a bill, and households who report an

[7] ElCom also provides information on the components of electricity prices, namely grid access costs, energy costs, municipality taxes, and green-energy encouragement taxes.
[8] Detailed descriptive statistics of the variables used in our analyses are available in Appendix 1.

electricity consumption below 300 kWh or above 30 000 kWh[9] are dropped from our analysis, which leaves us with a sample of 3763 observations. Figure 1 below presents the distribution of the model's response variable. The density function is strongly skewed to the right, indicating that the bulk of the observations are concentrated at the lower end of the electricity demand distribution. As it might be expected in positively skewed distributions, the median value is situated on the left of the mean of our sample, meaning that it is less sensitive to high energy users than the average. Because of this, statistical inference based on OLS estimation might be problematic, namely OLS is likely to better reflect the upper tail of the electricity distribution in detriment of the lower one. A possible remedy to this problem is taking the logarithm of electricity consumption, which indeed makes the density function of the dependent measure close to a normal density. However, a standard Breusch-Pagan test of heteroscedasticity in an OLS estimation shows that despite this transformation, the null hypothesis of a constant variance of error terms is soundly rejected, thus suggesting that an alternative method for addressing population heterogeneity might be necessary.

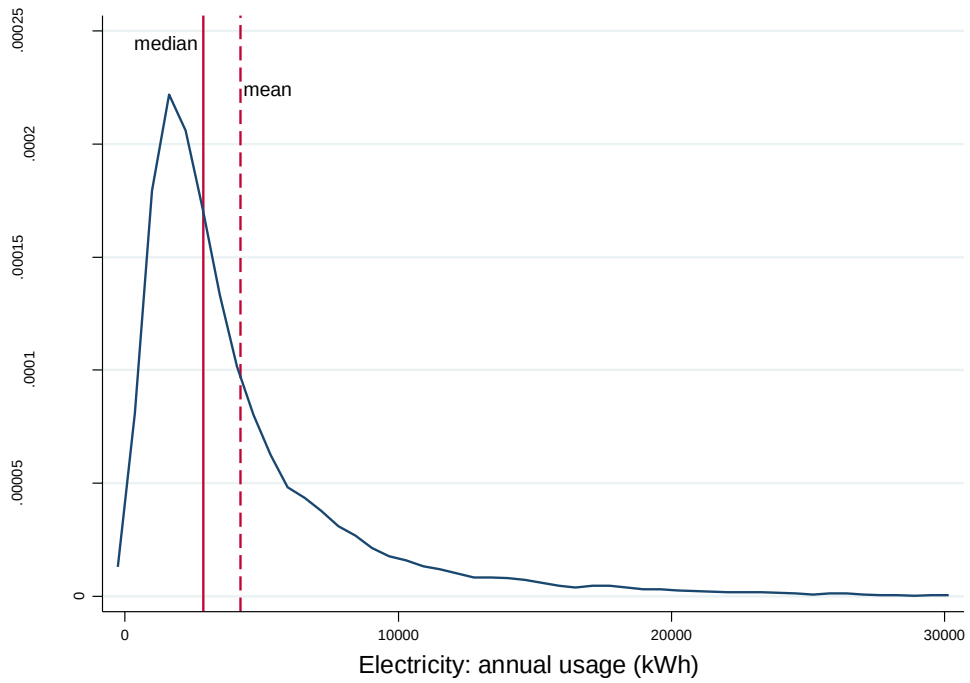



*Figure 1: Distribution of residential electricity demand*

[9] Thereby, we follow Boogen et al. (2014). We also apply an alternative strategy for excluding outliers proposed by Tukey (1977), by trimming data points standing more than three inter-quartile ranges from the lowest and highest quartiles. By doing so, we obtain similar results to the one discussed in section 4.

Average annual residential electricity use in our sample is 4390 kWh in 2015, 4087 kWh in 2016 and 4206 kWh in 2017. As discussed above, these numbers are characterized by substantial variation (with corresponding standard deviations of 4070 kWh, 4006 kWh, 4026 kWh) between consumers. They are also higher compared to previous estimations using metered data provided by utilities (Boogen et al., 2014; Boogen et al., 2017), but are at the same time lower in comparison to official energy statistics from the Swiss Federal Office of Energy, which reports an average annual residential electricity consumption of 5096 kWh and 5106 kWh for 2015 and 2016, respectively. A possible explanation for this discrepancy with official statistics is that the SHEDS does not cover the canton of Ticino, which is characterized by a generalized use of electrical resistance heaters by households, thus consuming about 30% more electricity with respect to the rest of Switzerland (Eymann et al., 2014).

### 3.3 Independent variables

We consider three major sets of control variables: (1) socioeconomic and sociodemographic determinants (income, prices, household composition, age, gender, education, nationality, occupational status), (2) dwelling and domain-specific characteristics (tenure type, dwelling age, size, the use of electricity for heating, stock of electricity using devices) and (3) psychological factors (environmental, altruistic, egoistic and hedonic). In addition, we add a cantonal fixed effect in order to control for unobserved characteristics, a binary variable for our price-imputation strategy[10] and year dummy, since we use pooled data. Within, the first of these groups, electricity prices and gross income are the main variables of interest for our analyses. As mentioned previously, due to the very definition of electricity prices, a spurious relationship between electricity usage and prices can be expected. Although, as Figure 2 suggests, a negative relationship between prices and electricity demand can be observed, it is not clear to what extent it can be attributed to endogeneity bias, and to what extent such a bias can alter not only the sign, but also the magnitude of the estimated

[10] The price data obtained by the ElCom shows that grid access fees represent 50% of the total electricity cost, while the use of energy, the related taxes and the compensatory feed-in remuneration costs (i.e., the Swiss Federal Government's program for encouraging energy production from renewable sources) have average shares of 38%, 5% and 7%, respectively.

coefficient. Moreover, at this descriptive level we do not control for other household or dwelling characteristics, in the presence of which the relationship described in Figure 2 may not hold.

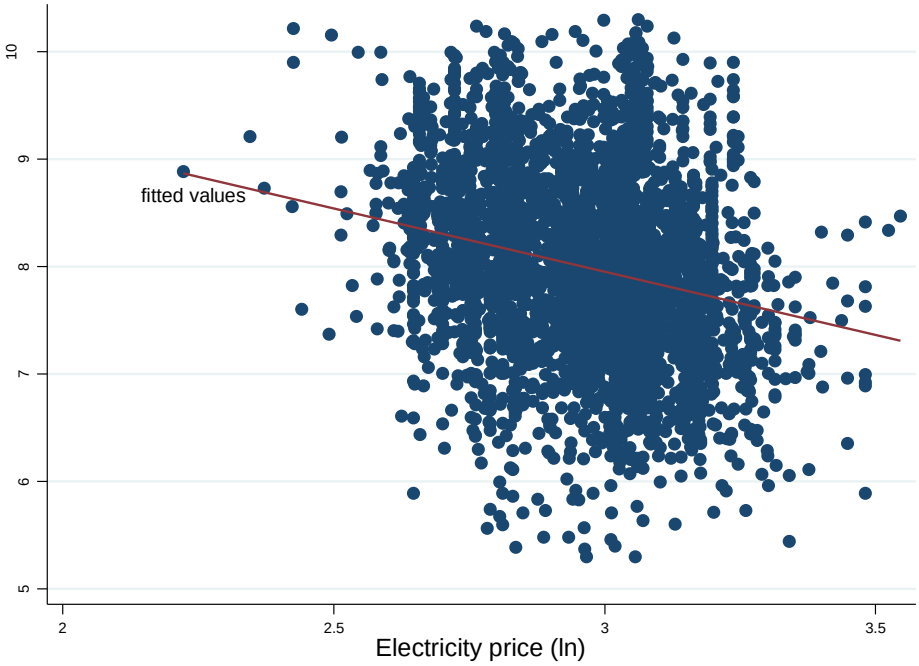



*Figure 2: Relationship between electricity demand and electricity prices*

We address the issue of endogeneity by using the main component of electricity prices - the cost of grid access. More precisely, we use the difference in the median grid access tariffs between municipalities. The rationale behind this proxy is that the cost of having access to the electricity grid is dependent on characteristics exogenous to the decision of electricity consumption, namely the construction and the maintenance of the electricity network in each municipality, which are themselves determined by topography-related features. For instance, the cost of construction of standard voltage lines is approximately 50 000 CHF per kilometer in the flat Mittelland region, while it is two and a half times higher in the mountainous Alps region, according to the Association of Electricity Companies (AES) in Switzerland (Wiederkehr et al., 2007). Figure 3 indeed suggests that mountainous regions are characterized by higher median costs of access to the network.

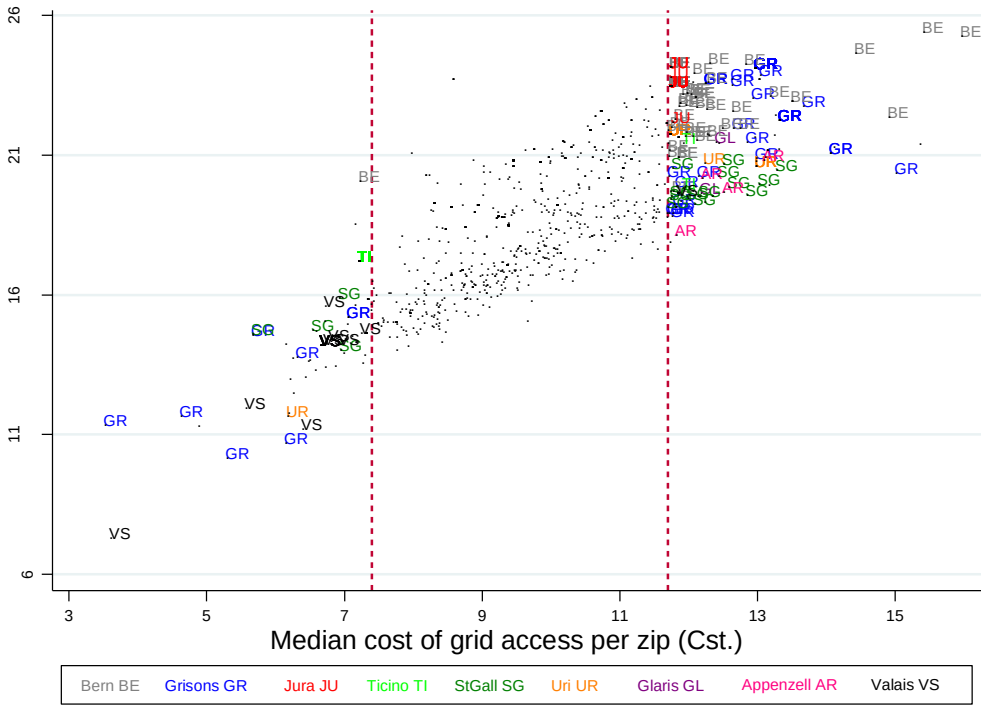



*Figure 3: Electricity prices and median grid tariffs per municipality*

The x-axis represents the total electricity cost a given municipality pays on average, i.e., the electricity price averaged for three years (2015 to 2017) and across the household types described at the end of section 3.1. The y-axis represents the median cost of access to the electricity network, also averaged over the same time period and across different household groups. Thus, every point in figure 3 represents a zip code corresponding to certain municipality. First, we observe that grid access costs can be considered as good proxy for the price of electricity, given the clear positive relationship between these two variables. Second, we are interested in whether high grid access costs reflect the characteristics of the terrain. For this purpose, we represent the 10% of the municipalities with the lowest grid tariffs and the 10% with the highest network access fees with two vertical dashed lines. When these municipalities are situated in a mountainous canton[11], we graphically replace the observation point with an abbreviation for this canton. Indeed, we observe that municipalities with high median grid access costs are mainly situated in the Alps and the Jura regions.

[11] We consider cantons with an average altitude of 1000 meters or above. An exception is the Jura canton, where the landscape is nevertheless mountainous.

Among the 10% of municipalities with the highest grid access fee represented in figure 3, about 70% lie in mountainous cantons, whereas in the 10% of municipalities with the lowest access cost, only approximately 37% are situated in those cantons. Hence, we consider that in our model, median grid access fees could be considered as exogenous approximation of electricity costs[12].

The second potentially important driver of residential electricity demand we focus on - gross income - is obtained as the mid-point of the income interval reported by the interviewee, where we use the Pareto-curve-based procedure for open-ended income categories suggested by Celeste et al. (2013). For some sociodemographic attributes, like gender, age, nationality, education or occupational status, the respondent's own characteristics are taken as representative of the household. The same approach is adopted with respect to participants' individual attitudes towards various psychological factors, although more complex interactions between household members may determine distinguishable psychological characteristics of the household as an inseparable entity (Volland, 2017). Attitudinal attributes are "revealed" using various batteries of questions from the psychological module of the SHEDS. We reduce their dimensionality through principal component analysis (PCA), and similarly to previous research find *"…support* […] *that hedonic, egoistic, altruistic, and biospheric values can be distinguished empirically"* (Steg et al., 2014). Thus we control for the household's environmental, altruistic and hedonic attitude, as well as for its aspiration for social power. Although the Kaiser–Meyer–Olkin statistic of sampling adequacy indicates that the continuous measures obtained from PCA are of good quality ($KMO \geq 0.7$), thus justifying the use of this statistical technique, the interpretation of the magnitude of the impact of these variables in the ensuing regression analysis is not straightforward. We, therefore, are only interested in their sign and significance.

The third category of determinants considered in relation with energy expenditures contains dwelling-related and characteristics. Similarly to income, a mid-point interval method is used to create a continuous variable containing the construction year of the dwelling. Other dwelling attributes such as the type of

[12] Not all zip codes can be directly matched with price data from ElCom (about 33% of our data). In that case, we assume that the price of the closest neighbor in applies. We use a binary variable to control for this imputation strategy.

residence, its age and size are in addition used following previous research (Guerra Santin et al., 2009; Meier & Rehdanz, 2010; Sardianou, 2008). We also control for electricity-using heating/cooling devices, such as the use of electric pump, electric resistance heaters or electric boilers for warm water. As in most European countries, in Switzerland electricity can be directly used for heating purposes although this practice is strongly restricted or discouraged (SuisseEnergie & EnFK, 2017). Similarly to technical equipment, we consider as given the total number of different electricity-powered devices (varying from smartphones to swimming pools) owned by the household, as well as the possession of electricity-powered vehicles (electric car and electric bike).

Who are the "frugal Jane" and "the wasteful John"? Descriptive statistics presented in Appendix 2, show the average characteristics of the previously discussed covariates per quantile of the response variable. We observe that at the descriptive level, frugal electricity users are households with lower incomes, composed predominantly of smaller number of individuals, with mainly female heads. They are about ten years younger, compared to their counterparts in the $9^{th}$ decile of electricity consumption, and are mainly tenants living in (older) flats, and unsurprisingly possess a lower stock of electricity-using durables. These households also seem to be more environmentally friendly and caring for the others, and less concerned by social power and hedonic attitude. The opposite is true for energy intensive consumers. In order to be able to assess the significance of the individual impacts of those socio-economic, -demographic and dwelling characteristics on electricity demand for consumers of different intensity, we turn to the conditional OLS and QR estimations discussed in section 2.

## 4. Findings

The first column of table 1 presents results from OLS regression, which we compare with a QR estimation for nine deciles of the dependent variable showed in columns two to ten. The standard least squares model confirms several previously well-documented phenomena. First, as economic theory suggests, an increase in electricity prices has a negative impact of on electricity consumption, with a price elasticity of about

-0.18, meaning that an increase of one percent in the price of electricity will on average reduce the demand for energy by 0.18 percent. This is close to the lower bound of the interval of most frequent short-run estimates (-0.2 to -0.4) suggested by previous studies (Fan & Hyndman, 2011; Reiss & White, 2005). This value is also lower in comparison to earlier analyses for Switzerland (Boogen et al., 2017; Filippini, 1999), which find short-run price elasticity of about -0.3. We cannot exclude that this is due to the use of median grid access as proxy for electricity price, which by capturing differences in prices between municipalities allows for less variation in the change of prices between households.

If it concerns income, we find an insignificant influence on electricity demand, with a magnitude close to zero, in line with other works (Alberini et al., 2011; Bedir et al., 2013; Grønhøj & Thøgersen, 2011; Kavousian et al., 2013; Leahy & Lyons, 2010; O'Doherty et al., 2008). As noticed by Alberini et al. (2011), this result might be driven by the high correlation with some dwelling features, such as its size and the presence of electronic durables in the home. Although based on the VIF criterion we do not find that correlation among variables is problematic (VIF<2), similarly to Alberini et al.'s (2011) study income elasticity increases and becomes statistically significant (0.11) when we omit the size of the living area and the stock of electricity-using devices[13] from our model. This suggests that it is likely that these two characteristics capture an affluence feature of households, also reflected by income.

The coefficients of covariates describing the life-cycle stage of the households, such as its size and its age, also correspond to previous findings. Important economies of scale can be observed with additional household members. For instance, a two-member household uses only 17%[14] more electricity than a single-member household, while a more-than-three-member household uses only 25% more energy. Given that the Swiss Federal Statistical Office foresees an increase of single and two-person households (4% each), in

[13] The estimated OLS coefficients for electricity-using stock have the expected signs and sizes, except for the possession of electric bike. We find that having a bicycle powered by electricity is quite surprisingly related to a lower use of electricity. However, we cannot exclude that the ownership of an electric bike translates some energy-specific attitude of households, such as "energy" or environmental concern, or some dwelling occupation pattern.

[14] We apply the exponential transformation ($e^{0.1557} - 1$) necessary for semi-logarithmic relationships (Halvorsen & Palmquist, 1980). From here on, only transformed coefficients of binary controls are discussed.

detriment of three- and more member households (decreases by 3% and 5%, respectively) in the 2015-2045 horizon (Kohli et al., 2015), our results suggests that electricity demand will grow by about 1% due to this demographic transition alone. The relationship between age and electricity is also positive and is described by an inversed U-shape, as the negative sign of the squared age term suggests. The peak of electricity demand is reached at 57.5 years, falling in the intervals estimated by previous research (McLoughlin et al., 2012; O'Doherty et al., 2008).

The ownership and the type of the dwelling have both a significant positive impacts on electricity demand. Households who own their homes use approximately 6% more electricity than tenants. This contrasts with the general finding that homeowners make important capital investments in energy efficiency or dwelling renovation more easily, compared to tenants (Frederiks et al., 2015). Official Swiss statistics attribute this difference to the fact that for an important number of tenants a part of the energy costs are included in their rents or are shared with their cohabitants (SHBS, 2011). For instance, elevator or lighting expenditures could be accounted for in a more general category of genitor costs (included in the rent), which is not directly paid to the electricity provider by the household itself, and is thus (often) not considered as an electricity expenditure by tenants. However, this reasoning seems more related to the type of dwelling (flat or house), rather to its ownership, for costs are shared only in multi-family buildings. Instead, the ownership of the home might conceal a wealth effect: in Switzerland, an initial investment of 20% of the value of the real estate is required by law in order to acquire a new dwelling, and thus only about 45% of the Swiss population owns its accommodation (SFOS, 2018)[15]. With respect to the type of dwelling, we observe that houses use significantly more energy due to several reasons. For one, the previously mentioned shared energy costs do not apply to detached buildings, such as houses. Second, the presence of contiguous walls of flats renders heating more efficient, while houses have greater exterior surfaces. Thirdly, a greater number of electronic

[15] There is a tax component related to dwelling acquisition as well. Homeowners must declare the dwelling's rental value, which corresponds to the income they would have earned from renting it. In return, they can deduct mortgage interest and maintenance costs from their taxable income (AFC, 2015). More generally, an analysis of Dutch households by Haffner & Boumeester (2010) has shown the relationship between tenure type and income in *"that households with higher incomes are leaving the rental sector, while households with lower incomes are moving into the sector"* (p. 818).

appliances for which we do not control are present in houses (such as grass trimmers, garden lighting and automatic garage doors)[16].

In order to study the effect of gender on electricity use, we focus in particular on one-member households as a common base for comparison. OLS results show that single households with a female head use about 15% less electricity than their male counterparts. Similarly, Brounen et al. (2012) observe that a higher fraction of female members in households is negatively related to per capita electricity consumption, while Grønhøj & Thøgersen (2011) notice that women report to do more efforts to save electricity than men *"... mostly, but not only, with regard to household chores that have traditionally been women's tasks"* (p.7740). Finally, we observe that among psychological factors, only the pro-environmental attitude is negatively (and significantly) related to electricity usage.

Conditional QR estimation, which is presented in the second part of table 1, comes to complete the notion of the "average Joe". Our QR model uses the same set of variables as those previously discussed in the OLS setup. In this new context of exploring the heterogeneity among households, we observe that electricity prices play a significant role only at the upper spectrum of the distribution of electricity demand, but an insignificant one at its lower part. That is, the estimated QR coefficients of prices become significant at generally accepted significance levels only for intensive electricity users, who represent less than half of our sample. At the $60^{th}$ percentile, the estimated price elasticity is approximately -0.16, whereas this value increases to -0.19, -0.21 and -0.27 in the $7^{th}$, $8^{th}$ and $9^{th}$ deciles, respectively. Such an increase suggests that households become more aware of and reactive to price changes as their electricity consumption grows[17]. Although, standard tests do not allow confirming that these coefficients are significantly different from one another, our findings provide (indicative) evidence that intensive energy consumers could be readily targeted by higher price rates, compared to low energy users. If in addition, intensive users become more

[16] This is also due to houses' bigger surfaces (garage, garden). In our model we control only for the size of the living surface.

[17] These results are confirmed across all alternative, random, non-repeating cross-sectional samples which we use for robustness checks. The output of three such random non-reproducible estimations are presented in Appendix 3. Following Parente & Santos Silva (2016), we verify that these results also hold when we use a QR with standard errors clustered by household id.

| Elec. use (kWh) (ln) | OLS | QR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | q10 | q20 | q30 | q40 | q50 | q60 | q70 | q80 | q90 |
| Gross income (ln) | -0.0016 | 0.0985** | -0.0099 | -0.0213 | -0.0362 | -0.0274 | 0.0032 | -0.0268 | -0.0534* | -0.0556 |
| | (0.0235) | (0.0468) | (0.0279) | (0.0215) | (0.0225) | (0.0244) | (0.0285) | (0.0285) | (0.0284) | (0.0401) |
| Elec. price (ln) proxy | -0.1761** | -0.0038 | 0.0440 | 0.0465 | -0.0223 | -0.1021 | -0.1642* | -0.1934** | -0.2049** | -0.2655** |
| | (0.0780) | (0.1289) | (0.0908) | (0.0958) | (0.0939) | (0.0867) | (0.0937) | (0.0901) | (0.0946) | (0.1276) |
| Year: 2016 | -0.0076 | -0.0496 | -0.0111 | -0.0009 | -0.0015 | -0.0025 | 0.0045 | -0.0120 | -0.0058 | -0.0108 |
| | (0.0248) | (0.0443) | (0.0310) | (0.0274) | (0.0269) | (0.0254) | (0.0260) | (0.0291) | (0.0284) | (0.0417) |
| Year: 2017 | -0.0313 | -0.0549 | -0.0280 | -0.0126 | -0.0176 | -0.0198 | 0.0038 | -0.0118 | -0.0168 | -0.0023 |
| | (0.0246) | (0.0443) | (0.0300) | (0.0271) | (0.0278) | (0.0249) | (0.0248) | (0.0279) | (0.0273) | (0.0373) |
| N of electronic devices | 0.0460*** | 0.0447*** | 0.0538*** | 0.0525*** | 0.0505*** | 0.0458*** | 0.0430*** | 0.0483*** | 0.0444*** | 0.0486*** |
| | (0.0039) | (0.0055) | (0.0046) | (0.0048) | (0.0049) | (0.0053) | (0.0050) | (0.0043) | (0.0045) | (0.0064) |
| Elec. for heating: yes | 0.2519*** | 0.0176 | 0.0595 | 0.1432*** | 0.1845*** | 0.2718*** | 0.2913*** | 0.3490*** | 0.3844*** | 0.4392*** |
| | (0.0325) | (0.0625) | (0.0456) | (0.0404) | (0.0450) | (0.0428) | (0.0420) | (0.0360) | (0.0386) | (0.0590) |
| Elec. for water: yes | 0.2833*** | 0.2168*** | 0.2531*** | 0.2640*** | 0.2865*** | 0.2914*** | 0.3314*** | 0.3389*** | 0.3492*** | 0.3559*** |
| | (0.0259) | (0.0575) | (0.0339) | (0.0307) | (0.0323) | (0.0322) | (0.0289) | (0.0274) | (0.0282) | (0.0339) |
| Electric car: yes | 0.1315* | 0.0187 | 0.1293* | 0.0877 | 0.1047 | 0.0930 | 0.0943 | 0.1121 | 0.2396* | 0.3462*** |
| | (0.0718) | (0.1561) | (0.0754) | (0.0612) | (0.0672) | (0.0693) | (0.0784) | (0.0911) | (0.1315) | (0.0986) |
| Electric bike: yes | -0.0610** | 0.0178 | -0.0202 | -0.0166 | -0.0487* | -0.0678** | -0.0476 | -0.0615** | -0.0715** | -0.0878** |
| | (0.0247) | (0.0470) | (0.0315) | (0.0257) | (0.0254) | (0.0289) | (0.0305) | (0.0295) | (0.0334) | (0.0387) |
| 1 HH memb. | -0.1557*** | -0.0806 | -0.1880*** | -0.1677*** | -0.1725*** | -0.2013*** | -0.1891*** | -0.1603*** | -0.1484*** | -0.1833*** |
| | (0.0384) | (0.0619) | (0.0514) | (0.0477) | (0.0456) | (0.0436) | (0.0440) | (0.0470) | (0.0491) | (0.0692) |
| 3 HH memb. | 0.1095*** | 0.1378** | 0.1442*** | 0.1389*** | 0.1260*** | 0.0821** | 0.0845** | 0.1127*** | 0.0948** | 0.0311 |
| | (0.0310) | (0.0629) | (0.0405) | (0.0350) | (0.0345) | (0.0331) | (0.0375) | (0.0329) | (0.0396) | (0.0527) |
| >3 HH memb. | 0.2238*** | 0.3043*** | 0.2747*** | 0.2390*** | 0.1991*** | 0.1913*** | 0.1830*** | 0.2425*** | 0.1919*** | 0.1368*** |
| | (0.0317) | (0.0604) | (0.0400) | (0.0360) | (0.0362) | (0.0360) | (0.0337) | (0.0333) | (0.0354) | (0.0503) |
| Age | 0.0227*** | 0.0245** | 0.0303*** | 0.0335*** | 0.0322*** | 0.0299*** | 0.0272*** | 0.0206*** | 0.0168** | 0.0044 |
| | (0.0057) | (0.0096) | (0.0072) | (0.0065) | (0.0068) | (0.0070) | (0.0078) | (0.0076) | (0.0083) | (0.0111) |
| Age squared | -0.0002*** | -0.0002* | -0.0002*** | -0.0003*** | -0.0002*** | -0.0002*** | -0.0002** | -0.0001 | -0.0001 | 0.0000 |
| | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) |
| Female | 0.0012 | -0.0443 | -0.0043 | -0.0133 | -0.0208 | -0.0226 | -0.0232 | 0.0102 | 0.0266 | 0.0878* |
| | (0.0284) | (0.0494) | (0.0316) | (0.0305) | (0.0331) | (0.0334) | (0.0314) | (0.0350) | (0.0389) | (0.0478) |
| Female x 1 HH memb. | -0.1373*** | -0.1884** | -0.1603** | -0.0905 | -0.1077* | -0.0667 | -0.0746 | -0.1539*** | -0.2235*** | -0.2938*** |
| | (0.0495) | (0.0798) | (0.0660) | (0.0627) | (0.0571) | (0.0576) | (0.0547) | (0.0585) | (0.0664) | (0.0847) |
| Owner | 0.0564** | 0.1155** | 0.0784* | 0.0735** | 0.0576* | 0.0300 | 0.0032 | -0.0148 | -0.0199 | -0.0425 |
| | (0.0272) | (0.0525) | (0.0405) | (0.0336) | (0.0326) | (0.0332) | (0.0319) | (0.0345) | (0.0348) | (0.0497) |
| Dwelling type: House | 0.4298*** | 0.3410*** | 0.3634*** | 0.3805*** | 0.3736*** | 0.4216*** | 0.4440*** | 0.4535*** | 0.4637*** | 0.4950*** |
| | (0.0284) | (0.0447) | (0.0342) | (0.0316) | (0.0300) | (0.0331) | (0.0339) | (0.0352) | (0.0391) | (0.0490) |
| Dwelling age | -0.0010*** | 0.0002 | -0.0004 | -0.0007** | -0.0011*** | -0.0009*** | -0.0010*** | -0.0012*** | -0.0012*** | -0.0018*** |
| | (0.0003) | (0.0005) | (0.0004) | (0.0003) | (0.0003) | (0.0003) | (0.0003) | (0.0003) | (0.0003) | (0.0004) |
| Dwelling size (ln) | 0.2609*** | 0.2759*** | 0.2661*** | 0.2850*** | 0.3028*** | 0.3009*** | 0.2891*** | 0.2453*** | 0.2628*** | 0.1964*** |
| | (0.0329) | (0.0603) | (0.0452) | (0.0415) | (0.0395) | (0.0383) | (0.0437) | (0.0432) | (0.0404) | (0.0542) |
| Environmental attitude | -0.0174** | -0.0193 | -0.0128 | -0.0166* | -0.0160* | -0.0200** | -0.0136* | -0.0165** | -0.0148 | -0.0201 |
| | (0.0075) | (0.0136) | (0.0083) | (0.0095) | (0.0095) | (0.0080) | (0.0075) | (0.0079) | (0.0096) | (0.0128) |
| Altruistic attitude | 0.0026 | 0.0092 | 0.0013 | 0.0063 | 0.0037 | 0.0041 | 0.0034 | -0.0019 | 0.0028 | 0.0030 |
| | (0.0074) | (0.0156) | (0.0090) | (0.0094) | (0.0099) | (0.0095) | (0.0087) | (0.0086) | (0.0111) | (0.0148) |
| Social power | -0.0073 | -0.0229 | -0.0133 | -0.0094 | -0.0106 | -0.0073 | 0.0031 | 0.0079 | -0.0014 | 0.0066 |
| | (0.0074) | (0.0142) | (0.0088) | (0.0073) | (0.0088) | (0.0088) | (0.0088) | (0.0082) | (0.0082) | (0.0119) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hedonic attitude | 0.0057 | 0.0150 | 0.0106 | 0.0035 | 0.0099 | 0.0049 | 0.0057 | 0.0061 | 0.0053 | 0.0011 |
| | (0.0068) | (0.0127) | (0.0097) | (0.0087) | (0.0098) | (0.0091) | (0.0091) | (0.0097) | (0.0099) | (0.0152) |
| Price imputation: yes | 0.0467** | 0.0477 | 0.0660** | 0.0237 | 0.0038 | 0.0215 | 0.0238 | 0.0193 | 0.0359 | 0.0798** |
| | (0.0213) | (0.0415) | (0.0279) | (0.0242) | (0.0239) | (0.0255) | (0.0269) | (0.0278) | (0.0253) | (0.0346) |
| Nationality | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Education | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Occupational status | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Canton | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Constant | 7.3339*** | 3.0837*** | 5.1249*** | 5.8993*** | 6.9498*** | 6.8868*** | 7.3718*** | 8.4883*** | 9.0223*** | 11.0083*** |
| | (0.6249) | (1.0703) | (0.8647) | (0.7007) | (0.6711) | (0.6432) | (0.7419) | (0.7124) | (0.7548) | (0.8405) |
| Observations | 3763 | 3763 | | | | | | | | |
| Adjusted $R^2$ | 0.53 | . | . | . | . | . | . | . | . | . |
| Pseudo $R^2$ | . | 0.29 | 0.33 | 0.35 | 0.36 | 0.37 | 0.38 | 0.39 | 0.39 | 0.37 |

Bootstrapped standard errors (200 replications) in parentheses, * p<0.10, ** p<0.05, *** p<0.010

*Table 1: Results from OLS and QR*

and more reactive to price variations, this would suggest that increasing price schemes could be put in place. Compared to the QR results, the OLS estimation discussed previously seems to mirror the lowest price elasticities of the high-end of the electricity demand spectrum. A policy measure, which based on an OLS estimation establishes higher electricity prices (at a flat rate) for all energy consumers runs hence the risk of penalizing electricity-frugal households without achieving its goal of reducing their electricity demand.

The influence of income across different quantiles of the dependent measure is insignificant, with exceptions in the first and eighth deciles. It is worth noticing that the signs of the estimated coefficient remain in all sample configurations: while it is positive in the $10^{th}$ percentile, it becomes negative in subsequent deciles. Households' initial reaction of using more energy with increasing income and then curving consumption after some affluence point is reached, could be related to the concept of an environmental Kuznets curve (EKC). However, robustness checks show that QR estimations with alternative sampling do not support a significant impact of income in none of the nine consumption groups, thus rejecting an EKC assumption. Yet, the coefficients of the tenure of the home seem to go in the direction of an EKC hypothesis as well, if we consider the ownership of the dwelling as a proxy for wealth, as discussed earlier in this paper. Similarly to income, households who own their homes consume more electricity for low levels of electricity requirements, but this effect decreases gradually and becomes negative (albeit insignificant) for intensive users. For this covariate, OLS appears to capture results applying to the lower part of the electricity distribution. In a nutshell, since homeowners are wealthier than tenants, they consume more energy, but the more electricity-intensive of them appear to make an effort to reduce their use of electricity. If true, this would suggest a close link between the tenant-owner gap and the EKC hypotheses. Put differently, it is conceivable that the tenant-owner gap stipulating that owners invest more in energy efficiency is only true for the most affluent of them, but not for owners with more limited resources, who instead use more electricity. As shown by Alberini et al. (2013), homeowners are before all *"responsive to the upfront costs of renovation projects"* (p.49). These considerations require a more in-depth investigation, which we leave to future research.

QR provides evidence for heterogeneity among electricity consumers for other household characteristics as well. For instance, we observe that economies of scale related to a greater number of household members are much more important at high deciles of electricity use, while the effect of age becomes linear in the 70$^{th}$ and 80$^{th}$ deciles and then disappears in the last decile. The vintage of the dwelling is not related to significantly lower levels of electricity requirements for low electricity usage, but becomes significant and greater in size in the upper quantiles. The coefficient of the interaction term describing single female households reveals that it is negatively correlated to electricity consumption at the two tails of the electricity distribution, but not around the median. Moreover, these effects are more pronounced at the right tail, which suggests that the effect of gender becomes more important with higher levels of consumption, probably translating women's increasing awareness of energy use. In contrast, we observe that it is around the median that the effect of a pro-environmental attitude is significant and highest in magnitude, whereas it is not different from zero at the two ends of the distribution of electricity. This might suggest that low and high electricity users could be presented with suitable information about energy's impact on the environment, in order to prevent the former from drastically increasing their future electricity use, and make the latter aware of the impact of their consumption. If it concerns the stock of electronic variables, we notice that while electricity usage does not vary substantially across consumption quantiles with the number of small-to-medium electronic devices, it does significantly with more important electricity-powered installations related to heating and warm water (resistance heating, electric pump, boiler), and mobility (electric car). A somewhat puzzling result is that the possession of an electric bike is not related to electricity in low deciles, whereas it increases in magnitude and its sign is negative in higher deciles. A possible explanation might be related to the fact that the ownership of an e-bike translates a specific attitude towards energy conservation, lifestyle or a particular dwelling occupation pattern[18].

[18] For instance, Plazier et al., (2017) find that a positive experience related to e-bikes makes individuals tolerate longer trips in comparisons with other means of transport, which might be related to less time spent at home.

Finally, table 1 shows that OLS translates different parts of the electricity distribution for different variables, thus making it less informative about the heterogeneity between different consumption groups. In order to gain a better view of the differences between OLS and QR estimations, and a clearer graphic description of the evolution of the estimated conditional quantile coefficients discussed above, figure 4 shows estimates of the coefficients of several chosen explanatory variables (vertical axis) over the distribution of residential electricity use (horizontal axis), with their respective confidence intervals (bootstrapped standard errors with 200 replications at a 90% confidence level).

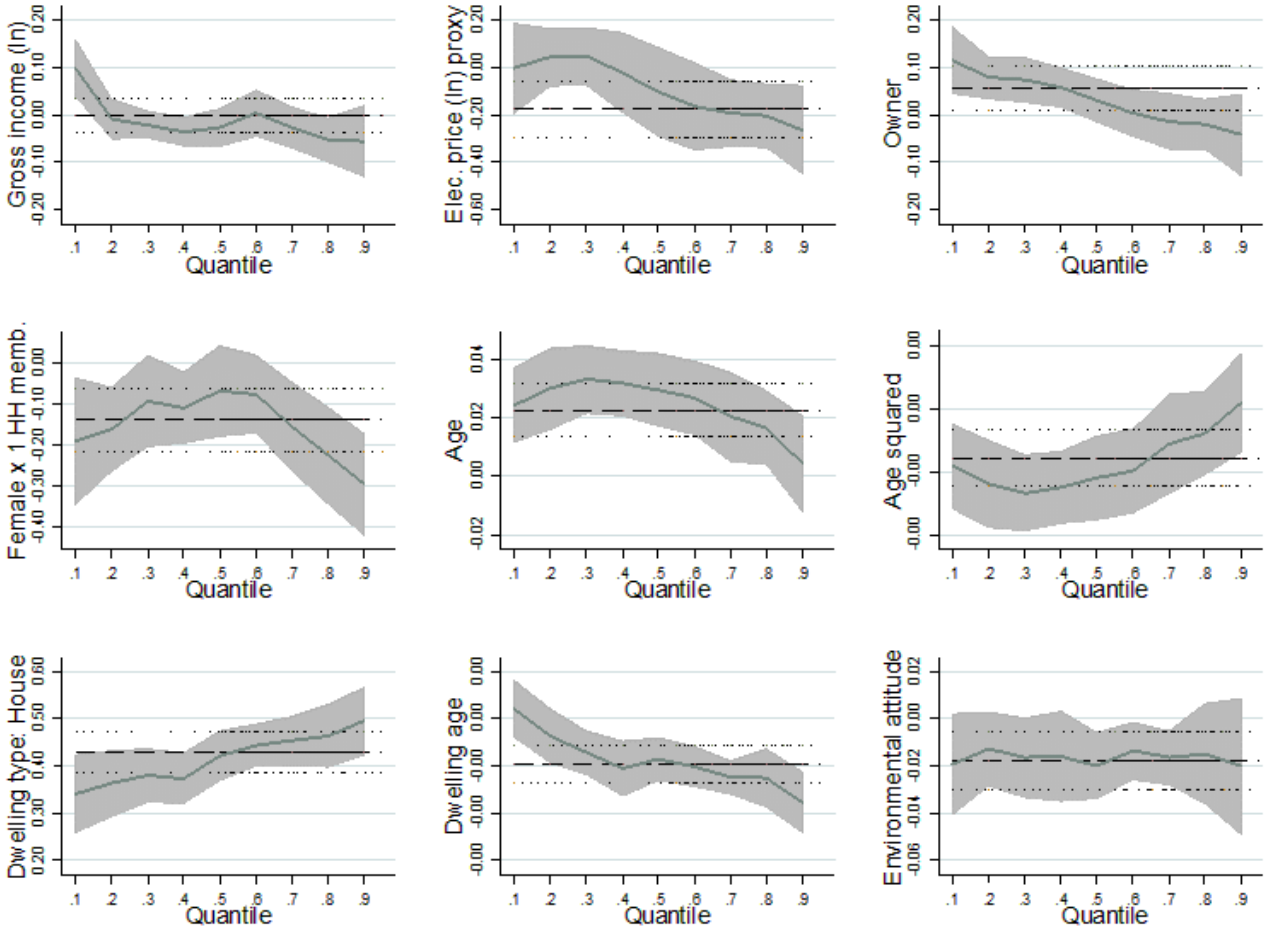



*Figure 4: Marginal effects of chosen regressors on deciles of residential energy consumption. OLS estimation is represented by a horizontal line, with two additional dotted lines as confidence intervals.*

## 5. Conclusion

In this article, we analyze the heterogeneity in the demand for electricity of households in Switzerland. For this purpose we use a quantile regression (QR) approach, which we compare with a standard OLS estimation. In particular, we are interested in the effects of electricity prices for different levels of electricity consumption. Because prices are endogenous by construction, we use the variation in the grid access costs between municipalities as a proxy. Network access fees are related to the specific topography of the municipality and are thus considered to be exogenous to household decisions of energy use. Our results show that for most covariates, OLS represents only a specific part of the electricity distribution. With respect to prices, the negative effect found in the least squares setup mirrors the estimated influence of prices in the upper tail of the electricity distribution. In fact, our QR model shows that up to the 5$^{th}$ decile households do not react to changes in prices, but afterwards their price-elasticities become significant, with an expected negative sign. At the 6$^{th}$ decile we estimate a short-run price-elasticity of -0.16 and the magnitude of this coefficient increases gradually to -0.27 in the 9$^{th}$ decile, thus finding indicative evidence for slightly increasing reactivity for high electricity users. These, and all QR results hold when instead of pooled panel data we use pooled cross-sections, suggesting that our estimates are not biased by the fact that our sample does not consist only of independent observations. Moreover, transforming our dataset to cross-sectional one allows us to have an infinity of alternative random cross-sectional samples with which we can perform robustness checks.

Although we do not observe a significant effect of income, the evolution of the magnitude of the estimated coefficient shows that affluence levels might be related to lower consumption of electricity. Both income and dwelling ownership, which we consider as indicators of households' general wealth, are positively related to electricity demand at the left tail of its distribution, but the estimated coefficients have a negative sign at the upper end of the spectrum of electricity use. Whereas these results are not significant for income, the positive effect of dwelling ownership is statistically different from zero at the low-end of the electricity

distribution, thus indicating that when frugal electricity users become wealthier, they also consume more energy.

With respect to policy implications, the two main aforementioned results suggest that a price and a wealth effect should be considered when designing policy measures based on household heterogeneity. Namely, if an electricity tax can curve the consumption of intensive electricity users, this will affect negatively the affluence levels of low electricity consumers. Since we find that the latter (which as descriptive statistics show) are also less affluent, and reactive to changes in their wealth, an electricity tax could be coupled with a subsidy for frugal energy users in order to avoid penalizing them. More generally, differences between an average OLS and a QR estimation can be also observed for other covariates included in our models, such as the stock of electronic durables, household composition, age or gender. Our results suggest that the "average Joe" differs from the "frugal Jane" and the "wasteful John" in a variety of aspects. This heterogeneity between consumers could be exploited by tailoring group-specific energy policies, adapting governance mechanisms or customizing business strategies.

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# Appendix

## Appendix 1: General descriptive statistics

| | Pooled data | | | | 2015 | | | | 2016 | | | | 2017 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mean | sd | min | max | mean | sd | min | max | mean | sd | min | max | mean | sd | min | max |
| Elec. use (kWh) | 4,228.15 | 4,096.17 | 200 | 29,680 | 4,379.4 | 4,070.23 | 200 | 28,000 | 4,087.33 | 4,006.53 | 230 | 27,390 | 4,273.63 | 4,206.1 | 200 | 29,680 |
| Electricity price (Cst.) | 19.77 | 3.27 | 9.23 | 34.65 | 19.96 | 2.98 | 10.71 | 29.94 | 19.64 | 3.17 | 11.31 | 33.90 | 19.77 | 3.56 | 9.23 | 34.65 |
| Grid access cost (Cst.) | 9.88 | 2.12 | 3.47 | 23.32 | 9.82 | 1.94 | 4.03 | 16.64 | 9.93 | 2.13 | 4.35 | 23.32 | 9.88 | 2.22 | 3.47 | 21.95 |
| Energy cost (Cst.) | 7.52 | 1.43 | 3.76 | 11.40 | 8.04 | 1.25 | 5.30 | 11.40 | 7.39 | 1.24 | 4.21 | 10.40 | 7.30 | 1.63 | 3.76 | 10.90 |
| Elec. tax (Cst.) | 1.04 | 0.78 | 0 | 7.06 | 1.01 | 0.83 | 0 | 7.04 | 1.02 | 0.76 | 0 | 7.03 | 1.08 | 0.76 | 0 | 7.06 |
| Median grid fee (Cst.) | 9.24 | 1.56 | 4.42 | 15.41 | 9.19 | 1.41 | 5.22 | 15.05 | 9.30 | 1.59 | 4.43 | 15.41 | 9.21 | 1.62 | 4.42 | 13.63 |
| Gross income (CHF) | 9,019.63 | 4,643.98 | 1,500 | 17,650 | 8,849.5 | 4,576.08 | 1,500 | 17,650 | 8,903.16 | 4,668.72 | 1,500 | 17,650.0 | 9,263.38 | 4,657.6 | 1,500 | 17,650 |
| Year: 2015 | 0.25 | 0.43 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Year: 2016 | 0.39 | 0.49 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| Year: 2017 | 0.36 | 0.48 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| N of electronic devices | 12.16 | 3.23 | 1 | 23 | 12.23 | 3.35 | 1 | 21 | 12 | 3.24 | 1 | 23 | 12.27 | 3.13 | 3 | 21 |
| Elec. for heat: yes | 0.23 | 0.42 | 0 | 1 | 0.23 | 0.42 | 0 | 1 | 0.22 | 0.42 | 0 | 1 | 0.24 | 0.42 | 0 | 1 |
| Elec. for heat: no | 0.77 | 0.42 | 0 | 1 | 0.77 | 0.42 | 0 | 1 | 0.78 | 0.42 | 0 | 1 | 0.76 | 0.42 | 0 | 1 |
| Elec. for water: yes | 0.37 | 0.48 | 0 | 1 | 0.38 | 0.49 | 0 | 1 | 0.37 | 0.48 | 0 | 1 | 0.37 | 0.48 | 0 | 1 |
| Elec. for water: no | 0.63 | 0.48 | 0 | 1 | 0.62 | 0.49 | 0 | 1 | 0.63 | 0.48 | 0 | 1 | 0.63 | 0.48 | 0 | 1 |
| Electric car: no | 0.98 | 0.15 | 0 | 1 | 0.96 | 0.19 | 0 | 1 | 0.98 | 0.15 | 0 | 1 | 0.98 | 0.13 | 0 | 1 |
| Electric car: yes | 0.02 | 0.15 | 0 | 1 | 0.04 | 0.19 | 0 | 1 | 0.02 | 0.15 | 0 | 1 | 0.02 | 0.13 | 0 | 1 |
| Electric bike: no | 0.82 | 0.39 | 0 | 1 | 0.83 | 0.38 | 0 | 1 | 0.83 | 0.37 | 0 | 1 | 0.79 | 0.40 | 0 | 1 |
| Electric bike: yes | 0.18 | 0.39 | 0 | 1 | 0.17 | 0.38 | 0 | 1 | 0.17 | 0.37 | 0 | 1 | 0.21 | 0.40 | 0 | 1 |
| 1 HH member | 0.25 | 0.44 | 0 | 1 | 0.25 | 0.43 | 0 | 1 | 0.27 | 0.45 | 0 | 1 | 0.23 | 0.42 | 0 | 1 |
| 2 HH members | 0.44 | 0.50 | 0 | 1 | 0.46 | 0.50 | 0 | 1 | 0.44 | 0.50 | 0 | 1 | 0.43 | 0.50 | 0 | 1 |
| 3 HH members | 0.12 | 0.33 | 0 | 1 | 0.12 | 0.32 | 0 | 1 | 0.12 | 0.32 | 0 | 1 | 0.14 | 0.34 | 0 | 1 |
| >3 HH members | 0.18 | 0.39 | 0 | 1 | 0.18 | 0.38 | 0 | 1 | 0.17 | 0.37 | 0 | 1 | 0.20 | 0.40 | 0 | 1 |
| Age | 53.72 | 14.40 | 19 | 90 | 55.65 | 14.10 | 19 | 90 | 52.92 | 14.42 | 19 | 85 | 53.23 | 14.48 | 20 | 86 |
| Male | 0.59 | 0.49 | 0 | 1 | 0.60 | 0.49 | 0 | 1 | 0.57 | 0.50 | 0 | 1 | 0.59 | 0.49 | 0 | 1 |
| Female | 0.41 | 0.49 | 0 | 1 | 0.40 | 0.49 | 0 | 1 | 0.43 | 0.50 | 0 | 1 | 0.41 | 0.49 | 0 | 1 |
| Female x 1 HH: no | 0.86 | 0.35 | 0 | 1 | 0.85 | 0.35 | 0 | 1 | 0.85 | 0.36 | 0 | 1 | 0.87 | 0.34 | 0 | 1 |
| Female x 1 HH: yes | 0.14 | 0.35 | 0 | 1 | 0.15 | 0.35 | 0 | 1 | 0.15 | 0.36 | 0 | 1 | 0.13 | 0.34 | 0 | 1 |
| Education: primary | 0.09 | 0.28 | 0 | 1 | 0.10 | 0.29 | 0 | 1 | 0.09 | 0.29 | 0 | 1 | 0.07 | 0.26 | 0 | 1 |
| Education: secondary | 0.46 | 0.50 | 0 | 1 | 0.50 | 0.50 | 0 | 1 | 0.47 | 0.50 | 0 | 1 | 0.42 | 0.49 | 0 | 1 |
| Education: tertiary | 0.46 | 0.50 | 0 | 1 | 0.41 | 0.49 | 0 | 1 | 0.44 | 0.50 | 0 | 1 | 0.50 | 0.50 | 0 | 1 |
| Nationality: Foreigner | 0.06 | 0.24 | 0 | 1 | 0.05 | 0.22 | 0 | 1 | 0.07 | 0.25 | 0 | 1 | 0.07 | 0.25 | 0 | 1 |
| Nationality: Swiss | 0.94 | 0.24 | 0 | 1 | 0.95 | 0.22 | 0 | 1 | 0.93 | 0.25 | 0 | 1 | 0.93 | 0.25 | 0 | 1 |
| Tenant | 0.47 | 0.50 | 0 | 1 | 0.42 | 0.49 | 0 | 1 | 0.50 | 0.50 | 0 | 1 | 0.47 | 0.50 | 0 | 1 |
| Owner | 0.53 | 0.50 | 0 | 1 | 0.58 | 0.49 | 0 | 1 | 0.50 | 0.50 | 0 | 1 | 0.53 | 0.50 | 0 | 1 |
| Dwelling type: Flat | 0.56 | 0.50 | 0 | 1 | 0.54 | 0.50 | 0 | 1 | 0.58 | 0.49 | 0 | 1 | 0.55 | 0.50 | 0 | 1 |
| Dwelling type: House | 0.44 | 0.50 | 0 | 1 | 0.46 | 0.50 | 0 | 1 | 0.42 | 0.49 | 0 | 1 | 0.45 | 0.50 | 0 | 1 |
| Dwelling age | 1,968.62 | 43.80 | 1,600 | 2,017 | 1,968.71 | 37.26 | 1,910 | 2,013 | 1,968.39 | 43.18 | 1,617 | 2,016 | 1,968.80 | 48.47 | 1,600 | 2,017 |
| Dwelling size (ln) | 4.74 | 0.47 | 2.30 | 6.91 | 4.77 | 0.47 | 2.30 | 6.91 | 4.71 | 0.47 | 2.56 | 6.91 | 4.76 | 0.46 | 3.09 | 6.91 |
| Environmental attitude | 0.23 | 1.61 | -7.27 | 2.46 | 0.34 | 1.57 | -6.34 | 2.46 | 0.20 | 1.61 | -6.38 | 2.43 | 0.20 | 1.63 | -7.27 | 2.44 |
| Altruistic attitude | 0.09 | 1.43 | -6.59 | 2.56 | 0.18 | 1.41 | -5.30 | 2.41 | 0.04 | 1.44 | -6.14 | 2.56 | 0.07 | 1.44 | -6.59 | 2.47 |
| Social power | -0.15 | 1.41 | -3.84 | 4.71 | 0 | 1.45 | -3.56 | 4.71 | -0.19 | 1.38 | -3.84 | 4.56 | -0.20 | 1.41 | -3.64 | 4.44 |
| Hedonic attitude | -0.23 | 1.40 | -5.37 | 2.45 | -0.23 | 1.36 | -5.37 | 2.43 | -0.27 | 1.43 | -5.28 | 2.45 | -0.19 | 1.39 | -5.31 | 2.44 |
| Price imputation: no | 0.67 | 0.47 | 0 | 1 | 0.68 | 0.47 | 0 | 1 | 0.66 | 0.47 | 0 | 1 | 0.67 | 0.47 | 0 | 1 |
| Price imputation: yes | 0.33 | 0.47 | 0 | 1 | 0.32 | 0.47 | 0 | 1 | 0.34 | 0.47 | 0 | 1 | 0.33 | 0.47 | 0 | 1 |
| School student | 0 | 0.04 | 0 | 1 | 0 | 0.05 | 0 | 1 | 0 | 0.06 | 0 | 1 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Student | 0.02 | 0.15 | 0 | 1 | 0.02 | 0.14 | 0 | 1 | 0.02 | 0.15 | 0 | 1 | 0.02 | 0.14 | 0 | 1 |
| Apprentice | 0 | 0.03 | 0 | 1 | 0 | 0.03 | 0 | 1 | 0 | 0.04 | 0 | 1 | 0 | 0.03 | 0 | 1 |
| Homemaker | 0.05 | 0.21 | 0 | 1 | 0.05 | 0.21 | 0 | 1 | 0.05 | 0.23 | 0 | 1 | 0.04 | 0.21 | 0 | 1 |
| Employee | 0.56 | 0.50 | 0 | 1 | 0.52 | 0.50 | 0 | 1 | 0.57 | 0.50 | 0 | 1 | 0.58 | 0.49 | 0 | 1 |
| Self-employed | 0.03 | 0.18 | 0 | 1 | 0.03 | 0.18 | 0 | 1 | 0.04 | 0.19 | 0 | 1 | 0.03 | 0.18 | 0 | 1 |
| Entrepreneur | 0.04 | 0.19 | 0 | 1 | 0.04 | 0.19 | 0 | 1 | 0.04 | 0.18 | 0 | 1 | 0.04 | 0.19 | 0 | 1 |
| Retired | 0.26 | 0.44 | 0 | 1 | 0.30 | 0.46 | 0 | 1 | 0.25 | 0.43 | 0 | 1 | 0.25 | 0.43 | 0 | 1 |
| Unemployed | 0.02 | 0.14 | 0 | 1 | 0.02 | 0.15 | 0 | 1 | 0.02 | 0.14 | 0 | 1 | 0.02 | 0.13 | 0 | 1 |
| Other | 0.01 | 0.12 | 0 | 1 | 0.02 | 0.13 | 0 | 1 | 0.01 | 0.09 | 0 | 1 | 0.02 | 0.13 | 0 | 1 |
| ZH | 0.19 | 0.39 | 0 | 1 | 0.18 | 0.39 | 0 | 1 | 0.20 | 0.40 | 0 | 1 | 0.18 | 0.38 | 0 | 1 |
| BE | 0.16 | 0.37 | 0 | 1 | 0.17 | 0.37 | 0 | 1 | 0.15 | 0.36 | 0 | 1 | 0.16 | 0.37 | 0 | 1 |
| LU | 0.05 | 0.22 | 0 | 1 | 0.05 | 0.21 | 0 | 1 | 0.06 | 0.23 | 0 | 1 | 0.06 | 0.23 | 0 | 1 |
| UR | 0 | 0.04 | 0 | 1 | 0 | 0.05 | 0 | 1 | 0 | 0.04 | 0 | 1 | 0 | 0.05 | 0 | 1 |
| SZ | 0.01 | 0.11 | 0 | 1 | 0.01 | 0.10 | 0 | 1 | 0.01 | 0.12 | 0 | 1 | 0.01 | 0.11 | 0 | 1 |
| OW | 0 | 0.06 | 0 | 1 | 0 | 0.05 | 0 | 1 | 0 | 0.06 | 0 | 1 | 0 | 0.06 | 0 | 1 |
| NW | 0.01 | 0.07 | 0 | 1 | 0.01 | 0.08 | 0 | 1 | 0.01 | 0.07 | 0 | 1 | 0.01 | 0.07 | 0 | 1 |
| GL | 0.01 | 0.08 | 0 | 1 | 0.01 | 0.07 | 0 | 1 | 0.01 | 0.09 | 0 | 1 | 0.01 | 0.09 | 0 | 1 |
| ZG | 0.01 | 0.12 | 0 | 1 | 0.02 | 0.12 | 0 | 1 | 0.01 | 0.12 | 0 | 1 | 0.01 | 0.12 | 0 | 1 |
| FR | 0.04 | 0.19 | 0 | 1 | 0.03 | 0.18 | 0 | 1 | 0.04 | 0.20 | 0 | 1 | 0.04 | 0.19 | 0 | 1 |
| SO | 0.03 | 0.16 | 0 | 1 | 0.02 | 0.15 | 0 | 1 | 0.03 | 0.18 | 0 | 1 | 0.03 | 0.16 | 0 | 1 |
| BS | 0.03 | 0.16 | 0 | 1 | 0.03 | 0.16 | 0 | 1 | 0.02 | 0.15 | 0 | 1 | 0.03 | 0.16 | 0 | 1 |
| BL | 0.03 | 0.17 | 0 | 1 | 0.03 | 0.17 | 0 | 1 | 0.03 | 0.17 | 0 | 1 | 0.03 | 0.17 | 0 | 1 |
| SH | 0.01 | 0.11 | 0 | 1 | 0.01 | 0.10 | 0 | 1 | 0.01 | 0.10 | 0 | 1 | 0.01 | 0.11 | 0 | 1 |
| AR | 0.01 | 0.08 | 0 | 1 | 0.01 | 0.07 | 0 | 1 | 0.01 | 0.09 | 0 | 1 | 0.01 | 0.09 | 0 | 1 |
| AI | 0 | 0.04 | 0 | 1 | 0 | 0.05 | 0 | 1 | 0 | 0.04 | 0 | 1 | 0 | 0.04 | 0 | 1 |
| SG | 0.06 | 0.25 | 0 | 1 | 0.08 | 0.27 | 0 | 1 | 0.06 | 0.25 | 0 | 1 | 0.06 | 0.23 | 0 | 1 |
| GR | 0.02 | 0.15 | 0 | 1 | 0.03 | 0.16 | 0 | 1 | 0.02 | 0.14 | 0 | 1 | 0.03 | 0.16 | 0 | 1 |
| AG | 0.09 | 0.28 | 0 | 1 | 0.09 | 0.29 | 0 | 1 | 0.08 | 0.27 | 0 | 1 | 0.09 | 0.28 | 0 | 1 |
| TG | 0.03 | 0.16 | 0 | 1 | 0.03 | 0.17 | 0 | 1 | 0.02 | 0.15 | 0 | 1 | 0.03 | 0.17 | 0 | 1 |
| VD | 0.11 | 0.31 | 0 | 1 | 0.10 | 0.30 | 0 | 1 | 0.11 | 0.31 | 0 | 1 | 0.10 | 0.30 | 0 | 1 |
| VS | 0.04 | 0.20 | 0 | 1 | 0.03 | 0.18 | 0 | 1 | 0.04 | 0.20 | 0 | 1 | 0.04 | 0.20 | 0 | 1 |
| NE | 0.02 | 0.15 | 0 | 1 | 0.03 | 0.16 | 0 | 1 | 0.02 | 0.14 | 0 | 1 | 0.03 | 0.16 | 0 | 1 |
| GE | 0.04 | 0.19 | 0 | 1 | 0.04 | 0.19 | 0 | 1 | 0.04 | 0.18 | 0 | 1 | 0.04 | 0.19 | 0 | 1 |
| JU | 0.01 | 0.09 | 0 | 1 | 0.01 | 0.10 | 0 | 1 | 0.01 | 0.08 | 0 | 1 | 0.01 | 0.08 | 0 | 1 |
| Observations | 3763 | | | | 948 | | | | 1457 | | | | 1358 | | | |

**Appendix 2: Descriptive statistics per decile of the dependent measure: averages per decile**

| | p10 | p20 | p30 | p40 | p50 | p60 | p70 | p80 | p90 |
|---|---|---|---|---|---|---|---|---|---|
| Elec. use (kWh) | 716.26 | 1,219.19 | 1,627.65 | 2,113.86 | 2,676.82 | 3,370.00 | 4,464.42 | 6,529.53 | 13,275.99 |
| Electricity price (Cst.) | 20.86 | 20.71 | 20.09 | 19.88 | 19.72 | 19.48 | 19.18 | 18.55 | 18.73 |
| Grid access cost (Cst.) | 10.63 | 10.44 | 10.14 | 9.88 | 9.92 | 9.84 | 9.54 | 9.18 | 8.98 |
| Energy cost (Cst.) | 7.75 | 7.76 | 7.57 | 7.66 | 7.38 | 7.33 | 7.31 | 7.17 | 7.50 |
| Elec. tax (Cst.) | 1.15 | 1.18 | 1.06 | 1.03 | 1.10 | 0.98 | 1.00 | 0.88 | 0.93 |
| Median grid fee (Cst.) | 9.14 | 9.11 | 8.96 | 9.02 | 9.14 | 9.29 | 9.30 | 9.32 | 9.19 |
| Gross income (CHF) | 6,636.93 | 7,786.37 | 7,886.30 | 8,890.95 | 8,681.40 | 9,459.66 | 10,129.71 | 9,993.86 | 10,621.05 |
| Year: 2015 | 0.22 | 0.22 | 0.22 | 0.25 | 0.25 | 0.25 | 0.24 | 0.24 | 0.26 |
| Year: 2016 | 0.40 | 0.37 | 0.44 | 0.39 | 0.38 | 0.38 | 0.38 | 0.39 | 0.35 |
| Year: 2017 | 0.38 | 0.40 | 0.35 | 0.36 | 0.37 | 0.38 | 0.38 | 0.36 | 0.39 |
| N of electronic devices | 9.19 | 9.94 | 11.10 | 12.05 | 12.19 | 12.60 | 13.34 | 13.71 | 14.13 |
| Elec. for heat: yes | 0.10 | 0.14 | 0.12 | 0.14 | 0.13 | 0.13 | 0.18 | 0.31 | 0.70 |
| Elec. for heat: no | 0.90 | 0.86 | 0.88 | 0.86 | 0.87 | 0.87 | 0.82 | 0.69 | 0.30 |
| Elec. for water: yes | 0.23 | 0.23 | 0.22 | 0.26 | 0.26 | 0.26 | 0.40 | 0.57 | 0.77 |
| Elec. for water: no | 0.77 | 0.77 | 0.78 | 0.74 | 0.74 | 0.74 | 0.60 | 0.43 | 0.23 |
| Electric car: no | 0.99 | 0.99 | 0.99 | 0.97 | 0.98 | 0.98 | 0.98 | 0.96 | 0.96 |
| Electric car: yes | 0.01 | 0.01 | 0.01 | 0.03 | 0.02 | 0.02 | 0.02 | 0.04 | 0.04 |
| Electric bike: no | 0.88 | 0.90 | 0.86 | 0.85 | 0.84 | 0.81 | 0.79 | 0.76 | 0.79 |
| Electric bike: yes | 0.12 | 0.10 | 0.14 | 0.15 | 0.16 | 0.19 | 0.21 | 0.24 | 0.21 |
| 1 HH member | 0.66 | 0.54 | 0.41 | 0.28 | 0.21 | 0.17 | 0.09 | 0.08 | 0.08 |
| 2 HH members | 0.26 | 0.37 | 0.43 | 0.51 | 0.51 | 0.52 | 0.43 | 0.43 | 0.44 |
| 3 HH members | 0.05 | 0.06 | 0.09 | 0.11 | 0.13 | 0.14 | 0.17 | 0.17 | 0.16 |
| >3 HH members | 0.03 | 0.04 | 0.06 | 0.11 | 0.15 | 0.17 | 0.31 | 0.32 | 0.32 |
| Age | 46.42 | 48.81 | 51.50 | 51.40 | 54.23 | 54.21 | 52.89 | 54.28 | 55.77 |
| Male | 0.41 | 0.47 | 0.51 | 0.56 | 0.57 | 0.59 | 0.64 | 0.62 | 0.62 |
| Female | 0.59 | 0.53 | 0.49 | 0.44 | 0.43 | 0.41 | 0.36 | 0.38 | 0.38 |
| Female x 1 HH: no | 0.59 | 0.66 | 0.77 | 0.85 | 0.89 | 0.92 | 0.96 | 0.95 | 0.95 |
| Female x 1 HH: yes | 0.41 | 0.34 | 0.23 | 0.15 | 0.11 | 0.08 | 0.04 | 0.05 | 0.05 |
| Education: primary | 0.07 | 0.08 | 0.08 | 0.09 | 0.11 | 0.11 | 0.07 | 0.07 | 0.07 |
| Education: secondary | 0.45 | 0.43 | 0.42 | 0.46 | 0.51 | 0.44 | 0.46 | 0.49 | 0.46 |
| Education: tertiary | 0.47 | 0.49 | 0.50 | 0.45 | 0.38 | 0.45 | 0.47 | 0.44 | 0.48 |
| Nationality: Foreigner | 0.14 | 0.09 | 0.08 | 0.07 | 0.07 | 0.05 | 0.06 | 0.03 | 0.06 |
| Nationality: Swiss | 0.86 | 0.91 | 0.92 | 0.93 | 0.93 | 0.95 | 0.94 | 0.97 | 0.94 |
| Tenant | 0.87 | 0.82 | 0.76 | 0.64 | 0.56 | 0.45 | 0.31 | 0.20 | 0.12 |
| Owner | 0.13 | 0.18 | 0.24 | 0.36 | 0.44 | 0.55 | 0.69 | 0.80 | 0.88 |
| Dwelling type: Flat | 0.87 | 0.91 | 0.86 | 0.81 | 0.73 | 0.58 | 0.40 | 0.20 | 0.10 |
| Dwelling type: House | 0.13 | 0.09 | 0.14 | 0.19 | 0.27 | 0.42 | 0.60 | 0.80 | 0.90 |
| Dwelling age | 1,960.26 | 1,966.00 | 1,970.29 | 1,974.11 | 1,971.23 | 1,974.00 | 1,965.04 | 1,970.62 | 1,974.64 |
| Dwelling size (ln) | 4.26 | 4.37 | 4.51 | 4.60 | 4.71 | 4.80 | 4.96 | 5.04 | 5.11 |
| Environmental attitude | 0.35 | 0.31 | 0.27 | 0.20 | 0.23 | 0.10 | -0.02 | 0.08 | 0.07 |
| Altruistic attitude | 0.17 | 0.22 | 0.09 | 0.12 | 0.04 | 0.07 | -0.04 | -0.12 | -0.00 |
| Social power | -0.22 | -0.19 | -0.22 | -0.18 | -0.22 | -0.15 | -0.14 | -0.09 | -0.01 |
| Hedonic attitude | -0.03 | -0.17 | -0.23 | -0.17 | -0.29 | -0.20 | -0.20 | -0.27 | -0.21 |
| Price imputation: no | 0.53 | 0.58 | 0.49 | 0.62 | 0.69 | 0.70 | 0.77 | 0.73 | 0.81 |
| Price imputation: yes | 0.47 | 0.42 | 0.51 | 0.38 | 0.31 | 0.30 | 0.23 | 0.27 | 0.19 |
| School student | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Student | 0.06 | 0.05 | 0.05 | 0.04 | 0.02 | 0.03 | 0.01 | 0.01 | 0.01 |
| Apprentice | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Homemaker | 0.02 | 0.01 | 0.04 | 0.04 | 0.05 | 0.06 | 0.09 | 0.07 | 0.07 |
| Employee | 0.63 | 0.63 | 0.57 | 0.55 | 0.51 | 0.54 | 0.58 | 0.61 | 0.52 |
| Self-employed | 0.05 | 0.03 | 0.01 | 0.03 | 0.03 | 0.02 | 0.04 | 0.05 | 0.02 |
| Entrepreneur | 0.03 | 0.03 | 0.04 | 0.03 | 0.03 | 0.02 | 0.05 | 0.03 | 0.07 |
| Retired | 0.16 | 0.20 | 0.25 | 0.27 | 0.31 | 0.29 | 0.20 | 0.20 | 0.27 |
| Unemployed | 0.03 | 0.03 | 0.02 | 0.02 | 0.04 | 0.02 | 0.02 | 0.01 | 0.01 |
| Other | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.01 | 0.01 | 0.02 |
| ZH | 0.21 | 0.19 | 0.26 | 0.25 | 0.22 | 0.22 | 0.17 | 0.18 | 0.14 |
| BE | 0.13 | 0.21 | 0.16 | 0.18 | 0.16 | 0.16 | 0.16 | 0.14 | 0.09 |
| LU | 0.06 | 0.08 | 0.05 | 0.07 | 0.04 | 0.05 | 0.06 | 0.05 | 0.04 |
| UR | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| SZ | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.02 | 0.01 |
| OW | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| NW | 0.01 | 0.00 | 0.01 | 0.00 | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 |
| GL | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 |
| ZG | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.02 | 0.03 | 0.01 | 0.01 |
| FR | 0.02 | 0.03 | 0.02 | 0.03 | 0.02 | 0.05 | 0.05 | 0.04 | 0.06 |
| SO | 0.02 | 0.03 | 0.03 | 0.01 | 0.02 | 0.02 | 0.03 | 0.05 | 0.03 |
| BS | 0.05 | 0.03 | 0.05 | 0.03 | 0.03 | 0.02 | 0.01 | 0.01 | 0.01 |
| BL | 0.04 | 0.04 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.01 |
| SH | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.03 |
| AR | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.01 |
| AI | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| SG | 0.04 | 0.05 | 0.05 | 0.04 | 0.07 | 0.09 | 0.08 | 0.06 | 0.06 |
| GR | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.03 | 0.04 |
| AG | 0.06 | 0.05 | 0.05 | 0.06 | 0.09 | 0.07 | 0.10 | 0.12 | 0.15 |
| TG | 0.01 | 0.03 | 0.01 | 0.02 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 |
| VD | 0.15 | 0.09 | 0.12 | 0.09 | 0.10 | 0.10 | 0.09 | 0.06 | 0.13 |
| VS | 0.03 | 0.02 | 0.02 | 0.04 | 0.04 | 0.03 | 0.03 | 0.05 | 0.08 |
| NE | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.02 | 0.01 |
| GE | 0.08 | 0.06 | 0.06 | 0.06 | 0.03 | 0.02 | 0.01 | 0.03 | 0.02 |
| JU | 0.00 | 0.00 | 0.01 | 0.01 | 0.02 | 0.00 | 0.01 | 0.01 | 0.01 |
| Observations | 550 | 543 | 546 | 558 | 533 | 546 | 546 | 546 | 546 |

## Appendix 3: Robustness checks: random cross-sectional samples[19]

| Elec. use (kWh) (ln) | OLS | QR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | q10 | q20 | q30 | q40 | q50 | q60 | q70 | q80 | q90 |
| Gross income (ln) | 0.0110 | 0.0947 | -0.0094 | -0.0206 | -0.0290 | 0.0004 | 0.0098 | -0.0392 | -0.0329 | -0.0257 |
| | (0.0278) | (0.0663) | (0.0403) | (0.0317) | (0.0310) | (0.0305) | (0.0365) | (0.0349) | (0.0377) | (0.0486) |
| Elec. price (ln) proxy | -0.2191** | -0.1148 | -0.0117 | -0.0504 | -0.1679 | -0.1700 | -0.2002** | -0.2795** | -0.2102* | -0.2822* |
| | (0.1058) | (0.1835) | (0.1439) | (0.1265) | (0.1160) | (0.1060) | (0.0994) | (0.1177) | (0.1160) | (0.1532) |
| Year: 2016 | -0.0282 | -0.1157** | -0.0345 | 0.0062 | 0.0030 | -0.0279 | -0.0189 | -0.0472 | -0.0541 | -0.0086 |
| | (0.0314) | (0.0574) | (0.0407) | (0.0360) | (0.0323) | (0.0324) | (0.0354) | (0.0367) | (0.0405) | (0.0548) |
| Year: 2017 | -0.0356 | -0.1042* | -0.0729* | -0.0102 | 0.0036 | -0.0218 | -0.0143 | -0.0329 | -0.0202 | 0.0055 |
| | (0.0311) | (0.0591) | (0.0440) | (0.0364) | (0.0351) | (0.0374) | (0.0376) | (0.0380) | (0.0428) | (0.0554) |
| N of electronic devices | 0.0501*** | 0.0493*** | 0.0553*** | 0.0587*** | 0.0525*** | 0.0504*** | 0.0481*** | 0.0494*** | 0.0491*** | 0.0526*** |
| | (0.0047) | (0.0082) | (0.0067) | (0.0058) | (0.0053) | (0.0054) | (0.0060) | (0.0056) | (0.0067) | (0.0084) |
| Elec. for heating: yes | 0.2284*** | 0.0101 | 0.0497 | 0.1167** | 0.1722*** | 0.2374*** | 0.2874*** | 0.3482*** | 0.3595*** | 0.3793*** |
| | (0.0387) | (0.0790) | (0.0599) | (0.0541) | (0.0554) | (0.0545) | (0.0529) | (0.0457) | (0.0492) | (0.0669) |
| Elec. for water: yes | 0.2960*** | 0.1933*** | 0.2661*** | 0.2913*** | 0.3092*** | 0.3157*** | 0.3427*** | 0.3525*** | 0.3678*** | 0.3604*** |
| | (0.0290) | (0.0731) | (0.0446) | (0.0415) | (0.0410) | (0.0376) | (0.0317) | (0.0353) | (0.0402) | (0.0436) |
| Electric car: yes | 0.1309 | -0.0709 | 0.1217 | 0.0884 | 0.1157 | 0.1002 | 0.1473 | 0.1313 | 0.2134 | 0.2861** |
| | (0.0882) | (0.1907) | (0.1228) | (0.0808) | (0.0824) | (0.0999) | (0.1038) | (0.1114) | (0.1667) | (0.1182) |
| Electric bike: yes | -0.0775** | 0.0236 | -0.0607 | -0.0644* | -0.0648* | -0.0821** | -0.0623 | -0.0782** | -0.0825** | -0.0902* |
| | (0.0320) | (0.0706) | (0.0407) | (0.0366) | (0.0366) | (0.0377) | (0.0390) | (0.0373) | (0.0405) | (0.0483) |
| 1 HH memb. | -0.1326*** | -0.0111 | -0.1652** | -0.0939 | -0.1225** | -0.1383** | -0.1671*** | -0.1942*** | -0.1642*** | -0.2080*** |
| | (0.0458) | (0.0800) | (0.0690) | (0.0583) | (0.0568) | (0.0549) | (0.0513) | (0.0553) | (0.0621) | (0.0788) |
| 3 HH memb. | 0.0971** | 0.0700 | 0.1499*** | 0.1331*** | 0.1224*** | 0.0928** | 0.0708 | 0.1112** | 0.0752 | 0.0154 |
| | (0.0430) | (0.0919) | (0.0557) | (0.0436) | (0.0422) | (0.0422) | (0.0481) | (0.0461) | (0.0531) | (0.0666) |
| >3 HH memb. | 0.2343*** | 0.3005*** | 0.3014*** | 0.2498*** | 0.2458*** | 0.2121*** | 0.1957*** | 0.2508*** | 0.2256*** | 0.1354** |
| | (0.0375) | (0.0785) | (0.0534) | (0.0424) | (0.0399) | (0.0418) | (0.0436) | (0.0428) | (0.0462) | (0.0677) |
| Age | 0.0190*** | 0.0193* | 0.0261*** | 0.0290*** | 0.0287*** | 0.0269*** | 0.0271*** | 0.0218** | 0.0180 | -0.0028 |
| | (0.0069) | (0.0113) | (0.0091) | (0.0083) | (0.0082) | (0.0078) | (0.0082) | (0.0086) | (0.0111) | (0.0136) |
| Age squared | -0.0001* | -0.0001 | -0.0002** | -0.0002** | -0.0002*** | -0.0002** | -0.0002** | -0.0001 | -0.0001 | 0.0001 |
| | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) |
| Female | -0.0010 | 0.0121 | -0.0117 | -0.0067 | -0.0025 | -0.0171 | -0.0233 | 0.0103 | 0.0346 | 0.0287 |
| | (0.0316) | (0.0661) | (0.0418) | (0.0357) | (0.0344) | (0.0364) | (0.0347) | (0.0380) | (0.0445) | (0.0533) |
| Female x 1 HH memb. | -0.1473*** | -0.2555** | -0.1521* | -0.1804** | -0.1777*** | -0.1167* | -0.1284** | -0.1618** | -0.2174*** | -0.2199** |
| | (0.0557) | (0.1017) | (0.0834) | (0.0706) | (0.0611) | (0.0641) | (0.0610) | (0.0667) | (0.0736) | (0.0909) |
| Education: secondary | 0.0254 | 0.0873 | 0.0514 | 0.0731 | 0.0487 | 0.0320 | -0.0188 | -0.0053 | -0.0454 | 0.0251 |
| | (0.0430) | (0.0950) | (0.0644) | (0.0602) | (0.0605) | (0.0637) | (0.0599) | (0.0601) | (0.0654) | (0.0803) |
| Education: tertiary | 0.0492 | 0.1216 | 0.0924 | 0.1167** | 0.0677 | 0.0174 | -0.0035 | -0.0066 | -0.0110 | -0.0182 |
| | (0.0423) | (0.0974) | (0.0663) | (0.0590) | (0.0571) | (0.0605) | (0.0577) | (0.0596) | (0.0610) | (0.0826) |
| Foreigner | -0.0008 | -0.1478 | -0.0998 | -0.0649 | -0.0437 | -0.0482 | 0.0096 | 0.0892 | 0.0390 | 0.1779 |
| | (0.0502) | (0.0973) | (0.0750) | (0.0546) | (0.0481) | (0.0565) | (0.0667) | (0.0670) | (0.0740) | (0.1099) |
| Owner | 0.0554* | 0.0786 | 0.0379 | 0.0782* | 0.0848** | 0.0491 | 0.0308 | 0.0096 | -0.0398 | -0.0804 |
| | (0.0334) | (0.0708) | (0.0538) | (0.0428) | (0.0376) | (0.0402) | (0.0400) | (0.0385) | (0.0405) | (0.0592) |
| Dwelling type: House | 0.4581*** | 0.4019*** | 0.4049*** | 0.3955*** | 0.3858*** | 0.4202*** | 0.4416*** | 0.4447*** | 0.4884*** | 0.5604*** |
| | (0.0325) | (0.0630) | (0.0446) | (0.0420) | (0.0401) | (0.0416) | (0.0384) | (0.0373) | (0.0484) | (0.0676) |
| Dwelling age | -0.0009*** | 0.0008 | -0.0000 | -0.0010** | -0.0011*** | -0.0011*** | -0.0012*** | -0.0013*** | -0.0011*** | -0.0014*** |
| | (0.0003) | (0.0007) | (0.0006) | (0.0004) | (0.0004) | (0.0003) | (0.0004) | (0.0004) | (0.0003) | (0.0005) |

[19] For parsimony, here we present the results of only three alternative random samples. The small difference in samples' sizes is due to our randomization strategy. For instance, if we decide to keep an observation of a given household only for the year 2017, but one of our covariates has a missing value for this particular year, then the observation is dropped. The differences in sample sizes are nevertheless negligible.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Dwelling size (ln) | 0.2221*** | 0.2569*** | 0.2801*** | 0.2544*** | 0.2662*** | 0.2637*** | 0.2117*** | 0.2054*** | 0.2266*** | 0.2083*** |
| | (0.0414) | (0.0811) | (0.0692) | (0.0606) | (0.0601) | (0.0571) | (0.0558) | (0.0490) | (0.0521) | (0.0614) |
| Environmental attitude | -0.0188* | -0.0248 | -0.0195 | -0.0282** | -0.0212* | -0.0218** | -0.0108 | -0.0115 | -0.0152 | -0.0121 |
| | (0.0098) | (0.0170) | (0.0128) | (0.0116) | (0.0111) | (0.0103) | (0.0113) | (0.0128) | (0.0130) | (0.0164) |
| Altruistic attitude | 0.0105 | 0.0335 | 0.0112 | 0.0188 | 0.0103 | 0.0071 | 0.0021 | -0.0019 | 0.0037 | 0.0098 |
| | (0.0107) | (0.0221) | (0.0145) | (0.0115) | (0.0112) | (0.0109) | (0.0111) | (0.0126) | (0.0151) | (0.0188) |
| Social power | -0.0106 | -0.0300 | -0.0193 | -0.0116 | -0.0140 | -0.0028 | 0.0003 | 0.0054 | -0.0069 | 0.0051 |
| | (0.0088) | (0.0183) | (0.0134) | (0.0102) | (0.0095) | (0.0090) | (0.0099) | (0.0101) | (0.0114) | (0.0143) |
| Hedonic attitude | -0.0011 | 0.0159 | 0.0057 | -0.0024 | 0.0052 | 0.0014 | -0.0038 | -0.0002 | -0.0013 | -0.0123 |
| | (0.0096) | (0.0166) | (0.0123) | (0.0103) | (0.0114) | (0.0113) | (0.0109) | (0.0120) | (0.0128) | (0.0163) |
| Price imputation: yes | 0.0559** | 0.0794 | 0.0466 | 0.0065 | -0.0123 | 0.0161 | 0.0297 | 0.0362 | 0.0423 | 0.1072** |
| | (0.0257) | (0.0548) | (0.0381) | (0.0345) | (0.0307) | (0.0313) | (0.0338) | (0.0331) | (0.0317) | (0.0478) |
| Occup. status: School student | 0.3258 | -0.5041 | 0.4187 | 0.2208 | 0.4708 | 0.4235 | 0.7800 | 0.5511 | 0.3592 | 0.4349 |
| | (0.4131) | (0.8273) | (0.8015) | (0.7420) | (0.6571) | (0.5344) | (0.4755) | (0.4275) | (0.3916) | (0.3665) |
| Occup. status: Student | 0.0129 | -0.0584 | -0.0450 | -0.0108 | -0.0059 | 0.0272 | -0.0224 | -0.0923 | 0.0153 | 0.1255 |
| | (0.0906) | (0.1606) | (0.1437) | (0.1218) | (0.0972) | (0.0938) | (0.1054) | (0.1203) | (0.1463) | (0.1694) |
| Occup. status: Apprentice | 0.0220 | -0.2707 | -0.5089 | 0.3451 | 0.1906 | 0.0631 | 0.1150 | 0.0202 | 0.3346 | -0.3086 |
| | (0.3410) | (0.6278) | (0.5934) | (0.5322) | (0.4939) | (0.4635) | (0.4471) | (0.4296) | (0.4475) | (0.3618) |
| Occup. status: Homemaker | 0.0775 | 0.1454 | 0.1100 | 0.1900*** | 0.1556*** | 0.1723*** | 0.1539*** | 0.0848 | 0.0501 | 0.0161 |
| | (0.0606) | (0.1317) | (0.0988) | (0.0693) | (0.0551) | (0.0568) | (0.0572) | (0.0620) | (0.0635) | (0.0926) |
| Occup. status: Self-employed | 0.0579 | 0.1498 | 0.0430 | 0.0008 | 0.0413 | 0.0325 | 0.0701 | -0.0227 | 0.0033 | 0.0579 |
| | (0.0720) | (0.1320) | (0.0797) | (0.0712) | (0.0814) | (0.0843) | (0.0790) | (0.0774) | (0.0973) | (0.1516) |
| Occup. status: Entrepreneur | 0.0618 | 0.0687 | -0.0101 | -0.0133 | 0.0606 | 0.1039 | 0.1013 | 0.0680 | 0.1353 | 0.1780* |
| | (0.0670) | (0.1410) | (0.0780) | (0.0929) | (0.0863) | (0.0810) | (0.0723) | (0.0809) | (0.0977) | (0.1009) |
| Occup. status: Retired | 0.0678 | 0.1751* | 0.0416 | 0.0571 | 0.0879 | 0.0224 | 0.0517 | 0.0075 | 0.0552 | -0.0602 |
| | (0.0510) | (0.1039) | (0.0725) | (0.0570) | (0.0546) | (0.0581) | (0.0577) | (0.0646) | (0.0731) | (0.0821) |
| Occup. status: Unemployed | -0.1056 | 0.0914 | 0.0206 | 0.0107 | 0.0339 | -0.0426 | -0.0802 | -0.2012** | -0.1693 | -0.1679 |
| | (0.0964) | (0.3033) | (0.1336) | (0.0828) | (0.0675) | (0.0668) | (0.0661) | (0.0882) | (0.1162) | (0.1280) |
| Occup. status: Other | 0.0697 | -0.1921 | 0.0913 | 0.1378 | 0.1542 | 0.0486 | 0.1846* | 0.1386 | 0.1359 | 0.0693 |
| | (0.1040) | (0.2833) | (0.1726) | (0.1238) | (0.1072) | (0.0990) | (0.1068) | (0.1047) | (0.1167) | (0.1178) |
| Canton: BE | -0.0163 | -0.0024 | -0.0981 | -0.0967 | -0.0369 | -0.0410 | -0.0772 | -0.0010 | -0.0217 | -0.1195 |
| | (0.0513) | (0.0806) | (0.0666) | (0.0594) | (0.0559) | (0.0512) | (0.0564) | (0.0720) | (0.0713) | (0.0914) |
| Canton: LU | -0.0382 | -0.0534 | -0.1077 | -0.0752 | -0.0489 | -0.0146 | -0.0456 | -0.0111 | -0.0145 | -0.1593* |
| | (0.0631) | (0.1184) | (0.1027) | (0.0744) | (0.0659) | (0.0670) | (0.0716) | (0.0716) | (0.0712) | (0.0834) |
| Canton: UR | 0.5330** | 0.3866 | 0.4556 | 0.3820 | 0.3809 | 0.5864* | 0.4145 | 0.4654 | 0.3036 | 0.8583* |
| | (0.2598) | (0.3506) | (0.3428) | (0.3012) | (0.2970) | (0.3251) | (0.3710) | (0.4216) | (0.4613) | (0.4388) |
| Canton: SZ | 0.2098* | 0.2329 | 0.1792 | 0.2431** | 0.2796** | 0.2694** | 0.2201** | 0.2282* | 0.1258 | 0.2034 |
| | (0.1161) | (0.4203) | (0.1516) | (0.1149) | (0.1124) | (0.1124) | (0.1028) | (0.1194) | (0.1340) | (0.1975) |
| Canton: OW | -0.1116 | -0.5129 | -0.7423 | -0.6101 | 0.0066 | -0.1203 | 0.1640 | 0.2958 | 0.1516 | -0.0199 |
| | (0.2652) | (0.3538) | (0.4721) | (0.5107) | (0.4813) | (0.4336) | (0.3949) | (0.3493) | (0.2574) | (0.1921) |
| Canton: NW | -0.0708 | 0.1503 | 0.0547 | -0.0026 | 0.0775 | -0.0105 | -0.1057 | -0.0003 | -0.1300 | -0.2836** |
| | (0.1534) | (0.5130) | (0.3949) | (0.2745) | (0.1624) | (0.1732) | (0.1953) | (0.1816) | (0.1548) | (0.1423) |
| Canton: GL | 0.1348 | -0.2957 | 0.1488 | 0.1102 | 0.1243 | 0.1147 | 0.1088 | 0.0602 | 0.2325 | 0.3007 |
| | (0.1649) | (0.5665) | (0.3110) | (0.1772) | (0.1391) | (0.1424) | (0.1755) | (0.2101) | (0.2208) | (0.3246) |
| Canton: ZG | 0.0058 | -0.0220 | -0.1111 | -0.0092 | 0.1785 | 0.0722 | 0.0450 | 0.0159 | 0.0326 | -0.0404 |
| | (0.0979) | (0.2351) | (0.1491) | (0.1664) | (0.1302) | (0.0984) | (0.1120) | (0.1312) | (0.1616) | (0.1637) |
| Canton: FR | 0.0927 | 0.2099* | 0.0281 | 0.0542 | 0.1104* | 0.0721 | 0.1057 | 0.0700 | -0.0280 | -0.0438 |
| | (0.0703) | (0.1087) | (0.0812) | (0.0598) | (0.0631) | (0.0728) | (0.0808) | (0.0747) | (0.0876) | (0.1344) |
| Canton: SO | -0.0151 | -0.4370* | -0.1040 | -0.0250 | 0.0806 | 0.0402 | 0.0644 | 0.0604 | 0.0336 | -0.2194* |
| | (0.0747) | (0.2518) | (0.1711) | (0.1118) | (0.0865) | (0.0937) | (0.0983) | (0.0876) | (0.0916) | (0.1190) |
| Canton: BS | -0.0901 | 0.0444 | -0.1896* | -0.1472 | -0.1044 | -0.0940 | -0.1334* | -0.1712** | -0.2134** | -0.2831* |
| | (0.0896) | (0.1623) | (0.1118) | (0.1064) | (0.0941) | (0.0863) | (0.0742) | (0.0820) | (0.0899) | (0.1589) |
| Canton: BL | -0.0083 | -0.1465 | -0.1842 | -0.0868 | 0.0310 | 0.0108 | 0.0664 | 0.0075 | -0.0424 | -0.1053 |
| | (0.0735) | (0.1534) | (0.1394) | (0.1259) | (0.0923) | (0.0966) | (0.0922) | (0.0788) | (0.1036) | (0.1333) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Canton: SH | 0.3456*** | 0.2077 | 0.1671 | 0.1228 | 0.2792 | 0.4082*** | 0.3803*** | 0.3756*** | 0.2638*** | 0.0173 |
| | (0.1001) | (0.1488) | (0.1245) | (0.1684) | (0.1979) | (0.1494) | (0.1146) | (0.1013) | (0.0953) | (0.2312) |
| Canton: AR | 0.1701 | 0.2744 | 0.1716 | 0.0259 | 0.2013 | 0.2446 | 0.1479 | 0.1488 | 0.0098 | -0.0519 |
| | (0.1427) | (0.2744) | (0.1516) | (0.1635) | (0.1666) | (0.1511) | (0.1509) | (0.1511) | (0.1925) | (0.3897) |
| Canton: AI | 0.2659* | 0.8106*** | 0.4150** | 0.5771*** | 0.5106*** | 0.3493** | 0.2058 | 0.1170 | 0.0376 | -0.3470* |
| | (0.1361) | (0.1721) | (0.1802) | (0.2172) | (0.1950) | (0.1565) | (0.1574) | (0.1486) | (0.1717) | (0.1904) |
| Canton: SG | 0.0407 | -0.0748 | -0.0345 | -0.0273 | 0.0524 | 0.0623 | 0.0450 | 0.0683 | 0.0271 | -0.0186 |
| | (0.0635) | (0.1627) | (0.0850) | (0.0728) | (0.0723) | (0.0673) | (0.0703) | (0.0723) | (0.0884) | (0.1208) |
| Canton: GR | 0.1960** | 0.1261 | 0.0632 | 0.0490 | 0.0668 | 0.0902 | 0.0974 | 0.1882 | 0.2713 | 0.2273 |
| | (0.0872) | (0.1271) | (0.0979) | (0.0839) | (0.0960) | (0.1121) | (0.1271) | (0.1655) | (0.1827) | (0.1954) |
| Canton: AG | 0.0742 | -0.0327 | -0.0130 | 0.0656 | 0.1110* | 0.1244** | 0.1197* | 0.1025* | 0.0486 | -0.0122 |
| | (0.0523) | (0.1424) | (0.0761) | (0.0641) | (0.0580) | (0.0623) | (0.0674) | (0.0620) | (0.0752) | (0.0954) |
| Canton: TG | 0.0451 | -0.0263 | -0.0115 | -0.0048 | 0.1500 | 0.1163 | 0.1026 | 0.1105 | 0.0658 | -0.1148 |
| | (0.0765) | (0.1680) | (0.1029) | (0.1008) | (0.0918) | (0.0751) | (0.0834) | (0.0841) | (0.0692) | (0.1045) |
| Canton: VD | -0.0268 | -0.1059 | -0.1787** | -0.1593*** | -0.0650 | -0.0263 | -0.0525 | -0.0204 | -0.0937 | -0.1014 |
| | (0.0547) | (0.0924) | (0.0701) | (0.0551) | (0.0544) | (0.0531) | (0.0625) | (0.0675) | (0.0613) | (0.1085) |
| Canton: VS | 0.0189 | 0.0547 | 0.0003 | -0.0207 | 0.0226 | 0.0385 | 0.1016 | 0.0905 | -0.0001 | -0.0809 |
| | (0.0789) | (0.1215) | (0.0827) | (0.0734) | (0.0813) | (0.0825) | (0.0972) | (0.0792) | (0.0816) | (0.1186) |
| Canton: NE | -0.0156 | 0.0526 | -0.0584 | -0.0957 | -0.0642 | -0.0649 | -0.0947 | -0.0884 | -0.0927 | -0.1424 |
| | (0.0671) | (0.1122) | (0.0910) | (0.0756) | (0.0746) | (0.0838) | (0.0893) | (0.1045) | (0.1231) | (0.1375) |
| Canton: GE | -0.0507 | -0.0277 | -0.0804 | -0.0971* | -0.0889 | -0.0939 | -0.1163 | -0.1238 | -0.0526 | -0.0013 |
| | (0.0652) | (0.1505) | (0.0715) | (0.0575) | (0.0564) | (0.0631) | (0.0716) | (0.0871) | (0.1148) | (0.1556) |
| Canton: JU | -0.0064 | 0.0238 | 0.0004 | 0.0708 | 0.0605 | 0.0867 | 0.0397 | -0.0030 | -0.1749 | -0.0631 |
| | (0.1594) | (0.5684) | (0.2362) | (0.1451) | (0.1295) | (0.1148) | (0.1164) | (0.1324) | (0.1924) | (0.2392) |
| Constant | 7.3636*** | 2.2129 | 4.5995*** | 6.7295*** | 7.4605*** | 7.3025*** | 7.9651*** | 8.9692*** | 8.7276*** | 10.1490*** |
| | (0.7982) | (1.6861) | (1.3352) | (0.9529) | (0.7943) | (0.7890) | (0.9236) | (0.8483) | (0.8096) | (1.0821) |
| Observations | 2483 | 2483 | | | | | | | | |
| Adjusted $R^2$ | 0.514 | . | . | . | . | . | . | . | . | . |
| Pseudo $R^2$ | . | 0.28 | 0.32 | 0.34 | 0.36 | 0.37 | 0.37 | 0.38 | 0.39 | 0.37 |

Bootstrapped standard errors (200 replications) in parentheses, * p<0.10, ** p<0.05, *** p<0.010

| Elec. use (kWh) (ln) | OLS | QR | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | q10 | q20 | q30 | q40 | q50 | q60 | q70 | q80 | q90 |
| Gross income (ln) | 0.0125 | 0.0659 | 0.0402 | -0.0056 | -0.0223 | -0.0012 | 0.0237 | -0.0253 | -0.0071 | 0.0055 |
| | (0.0305) | (0.0540) | (0.0433) | (0.0346) | (0.0296) | (0.0316) | (0.0386) | (0.0381) | (0.0385) | (0.0512) |
| Elec. price (ln) proxy | -0.2014* | -0.0340 | 0.0149 | 0.0004 | -0.0668 | -0.1278 | -0.1960 | -0.2814** | -0.2370* | -0.2966* |
| | (0.1055) | (0.1694) | (0.1344) | (0.1098) | (0.1139) | (0.1082) | (0.1235) | (0.1266) | (0.1358) | (0.1619) |
| Year: 2016 | 0.0082 | -0.0083 | 0.0049 | -0.0027 | -0.0030 | 0.0052 | 0.0150 | -0.0116 | -0.0151 | 0.0186 |
| | (0.0305) | (0.0588) | (0.0431) | (0.0358) | (0.0376) | (0.0369) | (0.0380) | (0.0398) | (0.0432) | (0.0575) |
| Year: 2017 | -0.0103 | -0.0509 | -0.0420 | -0.0208 | 0.0034 | 0.0026 | 0.0222 | 0.0004 | -0.0013 | 0.0099 |
| | (0.0302) | (0.0560) | (0.0441) | (0.0390) | (0.0400) | (0.0377) | (0.0387) | (0.0402) | (0.0414) | (0.0498) |
| N of electronic devices | 0.0463*** | 0.0442*** | 0.0502*** | 0.0489*** | 0.0497*** | 0.0475*** | 0.0465*** | 0.0484*** | 0.0440*** | 0.0458*** |
| | (0.0048) | (0.0082) | (0.0073) | (0.0064) | (0.0061) | (0.0055) | (0.0052) | (0.0050) | (0.0057) | (0.0091) |
| Elec. for heating: yes | 0.2434*** | 0.0689 | 0.0476 | 0.1339** | 0.1532*** | 0.2192*** | 0.3059*** | 0.3497*** | 0.3715*** | 0.3818*** |
| | (0.0426) | (0.0896) | (0.0620) | (0.0536) | (0.0532) | (0.0587) | (0.0554) | (0.0517) | (0.0509) | (0.0704) |
| Elec. for water: yes | 0.2772*** | 0.1845** | 0.2686*** | 0.2928*** | 0.3158*** | 0.3325*** | 0.3365*** | 0.3446*** | 0.3435*** | 0.3531*** |
| | (0.0311) | (0.0733) | (0.0448) | (0.0366) | (0.0354) | (0.0374) | (0.0342) | (0.0348) | (0.0338) | (0.0448) |
| Electric car: yes | 0.1893** | -0.0376 | 0.1298 | 0.1389* | 0.2173** | 0.1920* | 0.1926** | 0.1490 | 0.3776** | 0.3048*** |
| | (0.0801) | (0.2066) | (0.1066) | (0.0843) | (0.0927) | (0.0986) | (0.0888) | (0.1255) | (0.1514) | (0.0937) |
| Electric bike: yes | -0.0737** | 0.0615 | -0.0031 | -0.0238 | -0.0429 | -0.0567 | -0.0592 | -0.0893** | -0.0990** | -0.0919* |
| | (0.0301) | (0.0652) | (0.0442) | (0.0357) | (0.0346) | (0.0379) | (0.0377) | (0.0364) | (0.0411) | (0.0518) |
| 1 HH memb. | -0.1325*** | -0.0990 | -0.1284** | -0.0950 | -0.1232** | -0.1494*** | -0.2001*** | -0.2046*** | -0.1268** | -0.1540* |
| | (0.0466) | (0.0774) | (0.0635) | (0.0602) | (0.0517) | (0.0525) | (0.0544) | (0.0591) | (0.0627) | (0.0908) |
| 3 HH memb. | 0.1363*** | 0.1487* | 0.1431*** | 0.1713*** | 0.1481*** | 0.0987** | 0.1301*** | 0.1257*** | 0.1059** | 0.0716 |
| | (0.0429) | (0.0869) | (0.0489) | (0.0425) | (0.0428) | (0.0463) | (0.0476) | (0.0456) | (0.0517) | (0.0708) |
| >3 HH memb. | 0.2436*** | 0.3047*** | 0.2417*** | 0.2514*** | 0.2516*** | 0.2365*** | 0.2244*** | 0.2552*** | 0.2336*** | 0.1828*** |
| | (0.0375) | (0.0737) | (0.0509) | (0.0423) | (0.0408) | (0.0446) | (0.0451) | (0.0447) | (0.0471) | (0.0647) |
| Age | 0.0241*** | 0.0128 | 0.0276*** | 0.0266*** | 0.0310*** | 0.0348*** | 0.0335*** | 0.0230*** | 0.0247*** | 0.0099 |
| | (0.0069) | (0.0110) | (0.0085) | (0.0084) | (0.0079) | (0.0081) | (0.0087) | (0.0087) | (0.0092) | (0.0132) |
| Age squared | -0.0002** | -0.0001 | -0.0002** | -0.0002** | -0.0002*** | -0.0003*** | -0.0003*** | -0.0001 | -0.0002* | -0.0000 |
| | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) |
| Female | -0.0345 | -0.1125 | -0.0352 | -0.0187 | -0.0403 | -0.0210 | -0.0375 | -0.0308 | -0.0074 | 0.0062 |
| | (0.0340) | (0.0689) | (0.0443) | (0.0350) | (0.0352) | (0.0385) | (0.0392) | (0.0401) | (0.0470) | (0.0586) |
| Female x 1 HH memb. | -0.1285** | -0.0973 | -0.1429* | -0.1526** | -0.1180* | -0.1088* | -0.0925 | -0.1114 | -0.1838** | -0.1989* |
| | (0.0562) | (0.1051) | (0.0836) | (0.0726) | (0.0655) | (0.0654) | (0.0687) | (0.0742) | (0.0836) | (0.1111) |
| Education: secondary | 0.0238 | 0.0418 | 0.0229 | 0.0710 | 0.0508 | 0.0011 | -0.0478 | -0.0092 | -0.0266 | 0.0665 |
| | (0.0426) | (0.0843) | (0.0680) | (0.0491) | (0.0514) | (0.0533) | (0.0554) | (0.0553) | (0.0541) | (0.0712) |
| Education: tertiary | 0.0030 | 0.0022 | 0.0084 | 0.0552 | 0.0380 | -0.0072 | -0.0617 | -0.0459 | -0.0352 | 0.0146 |
| | (0.0414) | (0.0827) | (0.0691) | (0.0504) | (0.0533) | (0.0578) | (0.0568) | (0.0593) | (0.0554) | (0.0717) |
| Foreigner | 0.0032 | -0.0985 | -0.0239 | -0.0565 | -0.0200 | -0.0293 | 0.0188 | 0.0683 | 0.0311 | 0.1045 |
| | (0.0498) | (0.0935) | (0.0660) | (0.0575) | (0.0588) | (0.0622) | (0.0636) | (0.0635) | (0.0761) | (0.1115) |
| Owner | 0.0712* | 0.1286* | 0.0875 | 0.1014** | 0.0871** | 0.0465 | 0.0310 | 0.0181 | -0.0192 | -0.0361 |
| | (0.0364) | (0.0770) | (0.0553) | (0.0450) | (0.0421) | (0.0455) | (0.0414) | (0.0398) | (0.0398) | (0.0599) |
| Dwelling type: House | 0.4381*** | 0.3523*** | 0.3896*** | 0.3862*** | 0.3563*** | 0.4022*** | 0.4296*** | 0.4470*** | 0.4954*** | 0.5837*** |
| | (0.0351) | (0.0619) | (0.0451) | (0.0396) | (0.0389) | (0.0454) | (0.0424) | (0.0397) | (0.0486) | (0.0712) |
| Dwelling age | -0.0012*** | -0.0003 | -0.0005 | -0.0013*** | -0.0014*** | -0.0012*** | -0.0016*** | -0.0014*** | -0.0015*** | -0.0015*** |
| | (0.0003) | (0.0008) | (0.0006) | (0.0004) | (0.0003) | (0.0003) | (0.0003) | (0.0003) | (0.0003) | (0.0005) |
| Dwelling size (ln) | 0.2455*** | 0.3047*** | 0.3116*** | 0.2968*** | 0.2994*** | 0.2898*** | 0.2193*** | 0.2207*** | 0.2416*** | 0.1619** |
| | (0.0425) | (0.0747) | (0.0617) | (0.0484) | (0.0456) | (0.0509) | (0.0529) | (0.0527) | (0.0521) | (0.0699) |
| Environmental attitude | -0.0221** | -0.0219 | -0.0164 | -0.0170* | -0.0119 | -0.0176 | -0.0070 | -0.0102 | -0.0195 | -0.0238 |
| | (0.0100) | (0.0185) | (0.0118) | (0.0101) | (0.0098) | (0.0109) | (0.0122) | (0.0124) | (0.0134) | (0.0194) |
| Altruistic attitude | 0.0088 | 0.0089 | 0.0117 | 0.0138 | 0.0065 | 0.0086 | -0.0034 | -0.0035 | 0.0043 | 0.0109 |
| | (0.0101) | (0.0209) | (0.0145) | (0.0120) | (0.0113) | (0.0115) | (0.0125) | (0.0134) | (0.0162) | (0.0206) |
| Social power | -0.0041 | -0.0167 | -0.0059 | 0.0005 | -0.0014 | 0.0002 | 0.0059 | 0.0099 | -0.0070 | 0.0005 |
| | (0.0083) | (0.0200) | (0.0123) | (0.0107) | (0.0111) | (0.0109) | (0.0107) | (0.0106) | (0.0109) | (0.0155) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hedonic attitude | -0.0006 | 0.0004 | -0.0057 | 0.0055 | 0.0095 | -0.0002 | -0.0009 | 0.0023 | 0.0043 | 0.0064 |
| | (0.0094) | (0.0188) | (0.0133) | (0.0105) | (0.0115) | (0.0122) | (0.0115) | (0.0116) | (0.0120) | (0.0185) |
| Price imputation: yes | 0.0268 | -0.0284 | -0.0044 | -0.0069 | -0.0224 | -0.0079 | 0.0186 | 0.0182 | 0.0295 | 0.0805* |
| | (0.0303) | (0.0508) | (0.0414) | (0.0303) | (0.0286) | (0.0295) | (0.0298) | (0.0320) | (0.0323) | (0.0474) |
| Occup. status: School student | 0.3824 | -0.6603 | 0.5785 | 0.4771 | 0.4609 | 0.8991 | 0.7829 | 0.6051 | 0.4414 | 0.3820 |
| | (0.4838) | (0.9014) | (0.9260) | (0.8856) | (0.7804) | (0.6418) | (0.5056) | (0.3778) | (0.3779) | (0.4327) |
| Occup. status: Student | 0.0432 | -0.0750 | -0.0150 | -0.0399 | 0.0206 | 0.0657 | -0.0246 | -0.0314 | 0.0978 | 0.1472 |
| | (0.0948) | (0.1541) | (0.1190) | (0.1097) | (0.1036) | (0.0881) | (0.0963) | (0.1138) | (0.1478) | (0.1656) |
| Occup. status: Apprentice | 0.0583 | -0.2379 | -0.4280 | 0.3945 | 0.2175 | 0.0884 | 0.2078 | 0.0417 | 0.3080 | -0.1197 |
| | (0.3259) | (0.6563) | (0.5988) | (0.5419) | (0.4825) | (0.4014) | (0.3972) | (0.3588) | (0.3455) | (0.3237) |
| Occup. status: Homemaker | 0.0972* | 0.0952 | 0.1464 | 0.1699*** | 0.1512*** | 0.1361** | 0.1594** | 0.0825 | 0.0919 | 0.0682 |
| | (0.0571) | (0.1308) | (0.1003) | (0.0584) | (0.0517) | (0.0576) | (0.0628) | (0.0663) | (0.0742) | (0.0978) |
| Occup. status: Self-employed | 0.0389 | 0.0734 | 0.0073 | -0.0116 | -0.0301 | -0.0498 | -0.0123 | -0.0073 | -0.0073 | 0.0567 |
| | (0.0696) | (0.1240) | (0.1066) | (0.0757) | (0.0768) | (0.0814) | (0.0810) | (0.0776) | (0.1004) | (0.1645) |
| Occup. status: Entrepreneur | 0.0866 | 0.1191 | 0.0323 | 0.0093 | 0.0767 | 0.1092 | 0.0983 | 0.1345 | 0.1614* | 0.2016* |
| | (0.0761) | (0.1506) | (0.0750) | (0.0933) | (0.0795) | (0.0697) | (0.0786) | (0.0940) | (0.0915) | (0.1091) |
| Occup. status: Retired | 0.0520 | 0.1337 | 0.0710 | 0.0178 | 0.0359 | 0.0499 | 0.0611 | 0.0273 | 0.0435 | -0.0547 |
| | (0.0499) | (0.0978) | (0.0753) | (0.0630) | (0.0602) | (0.0593) | (0.0628) | (0.0666) | (0.0731) | (0.0902) |
| Occup. status: Unemployed | -0.0700 | 0.0522 | 0.1063 | 0.0110 | -0.0197 | -0.0620 | -0.1328 | -0.1976* | -0.1289 | -0.0969 |
| | (0.1042) | (0.2143) | (0.1236) | (0.0814) | (0.0722) | (0.0751) | (0.0834) | (0.1087) | (0.1411) | (0.1590) |
| Occup. status: Other | 0.1434 | -0.0234 | 0.1346 | -0.0085 | 0.0713 | 0.1043 | 0.1004 | 0.1423 | 0.1614 | 0.1148 |
| | (0.1246) | (0.3099) | (0.1764) | (0.1029) | (0.1154) | (0.1255) | (0.1310) | (0.1321) | (0.1419) | (0.2373) |
| Canton: BE | -0.0218 | -0.0760 | -0.0646 | -0.0971* | -0.0523 | -0.0281 | -0.0521 | 0.0142 | -0.0090 | -0.0989 |
| | (0.0510) | (0.0873) | (0.0694) | (0.0562) | (0.0520) | (0.0520) | (0.0614) | (0.0699) | (0.0720) | (0.0840) |
| Canton: LU | -0.0610 | -0.1034 | -0.1090 | -0.1265* | -0.0468 | -0.0341 | -0.0279 | -0.0652 | -0.0529 | -0.1945** |
| | (0.0626) | (0.1141) | (0.0783) | (0.0733) | (0.0729) | (0.0705) | (0.0741) | (0.0719) | (0.0806) | (0.0897) |
| Canton: UR | 0.5294* | 0.2796 | 0.4382 | 0.4225 | 0.3618 | 0.5859 | 0.4431 | 0.5041 | 0.3560 | 0.8254* |
| | (0.3046) | (0.3502) | (0.3238) | (0.3080) | (0.2969) | (0.3567) | (0.3881) | (0.4328) | (0.4867) | (0.4931) |
| Canton: SZ | 0.1280 | -0.1844 | 0.1785 | 0.2269** | 0.2676*** | 0.2684*** | 0.1731 | 0.2268* | 0.1049 | 0.0875 |
| | (0.1464) | (0.7666) | (0.2776) | (0.1109) | (0.1019) | (0.1001) | (0.1135) | (0.1310) | (0.1482) | (0.2017) |
| Canton: OW | -0.1944 | -0.6310 | -0.7059 | -0.6850 | -0.1749 | -0.1736 | -0.0273 | 0.2211 | 0.1561 | -0.0481 |
| | (0.2650) | (0.3968) | (0.4723) | (0.4749) | (0.4442) | (0.3972) | (0.4055) | (0.3885) | (0.3339) | (0.2775) |
| Canton: NW | -0.1157 | -0.2230 | 0.0302 | -0.0142 | 0.0874 | -0.0220 | -0.1115 | -0.1077 | -0.2797 | -0.2472 |
| | (0.1710) | (0.4182) | (0.4398) | (0.3075) | (0.2206) | (0.1926) | (0.1780) | (0.1656) | (0.1770) | (0.1694) |
| Canton: GL | 0.0759 | -0.2497 | 0.1711 | 0.0566 | 0.0690 | 0.0567 | 0.0147 | -0.0839 | 0.1294 | 0.2798 |
| | (0.1799) | (0.5325) | (0.3704) | (0.1470) | (0.1619) | (0.1614) | (0.1742) | (0.2120) | (0.2518) | (0.3130) |
| Canton: ZG | 0.0283 | -0.1060 | -0.1215 | 0.1314 | 0.1362 | 0.1119 | 0.1058 | 0.0310 | 0.0779 | 0.0135 |
| | (0.1109) | (0.2746) | (0.1900) | (0.1565) | (0.1095) | (0.0967) | (0.1145) | (0.1519) | (0.1805) | (0.1648) |
| Canton: FR | 0.1158* | 0.2830** | 0.1516* | 0.0744 | 0.1024 | 0.0970 | 0.0677 | 0.0476 | -0.0014 | -0.0738 |
| | (0.0689) | (0.1214) | (0.0801) | (0.0616) | (0.0630) | (0.0690) | (0.0785) | (0.0849) | (0.0974) | (0.1512) |
| Canton: SO | -0.0177 | -0.3340* | -0.1548 | -0.0848 | 0.0571 | 0.0555 | 0.0589 | 0.0830 | 0.0607 | -0.1663 |
| | (0.0911) | (0.1802) | (0.1813) | (0.1366) | (0.0958) | (0.0979) | (0.0948) | (0.0931) | (0.0970) | (0.1175) |
| Canton: BS | -0.0417 | -0.0342 | -0.1636 | -0.1493 | -0.1221 | -0.0811 | -0.1386* | -0.1516 | -0.1263 | -0.2206 |
| | (0.1131) | (0.1823) | (0.1084) | (0.0988) | (0.0872) | (0.0858) | (0.0828) | (0.0956) | (0.1022) | (0.3479) |
| Canton: BL | -0.0740 | -0.1823 | -0.1219 | -0.1314 | -0.0294 | -0.0016 | -0.0145 | -0.0278 | -0.0921 | -0.2365* |
| | (0.0737) | (0.1569) | (0.1389) | (0.1143) | (0.0999) | (0.1048) | (0.1013) | (0.0794) | (0.0842) | (0.1369) |
| Canton: SH | 0.3014*** | 0.1781 | 0.0933 | 0.0981 | 0.1864 | 0.3740** | 0.2780** | 0.3804*** | 0.2302** | 0.0056 |
| | (0.1072) | (0.1287) | (0.1394) | (0.1438) | (0.1700) | (0.1464) | (0.1283) | (0.1110) | (0.1050) | (0.2329) |
| Canton: AR | 0.1583 | 0.1964 | 0.1313 | 0.0413 | 0.2280 | 0.2245 | 0.1647 | 0.1309 | 0.0226 | -0.0801 |
| | (0.1425) | (0.2649) | (0.1938) | (0.1733) | (0.1785) | (0.1548) | (0.1494) | (0.1483) | (0.1925) | (0.4611) |
| Canton: AI | 0.2685** | 0.8211*** | 0.4354** | 0.5643** | 0.4925** | 0.3602** | 0.2097 | 0.0667 | -0.1036 | -0.3278* |
| | (0.1281) | (0.1702) | (0.1707) | (0.2236) | (0.2085) | (0.1791) | (0.1584) | (0.1291) | (0.1406) | (0.1835) |
| Canton: SG | -0.0030 | -0.1847 | -0.0673 | -0.0448 | 0.0101 | 0.0568 | 0.0216 | 0.0574 | 0.0031 | -0.0442 |
| | (0.0656) | (0.1670) | (0.0959) | (0.0679) | (0.0682) | (0.0750) | (0.0777) | (0.0729) | (0.0848) | (0.1301) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Canton: GR | 0.1649* | 0.0192 | 0.0936 | 0.0403 | 0.0513 | 0.1233 | 0.0716 | 0.0929 | 0.1893 | 0.2642 |
| | (0.0922) | (0.1205) | (0.1101) | (0.0854) | (0.0906) | (0.0910) | (0.1081) | (0.1351) | (0.1652) | (0.2208) |
| Canton: AG | 0.0923 | 0.1164 | 0.0664 | 0.0762 | 0.1256** | 0.1581** | 0.1316** | 0.1089* | 0.0244 | 0.0034 |
| | (0.0563) | (0.1234) | (0.0656) | (0.0583) | (0.0579) | (0.0625) | (0.0602) | (0.0566) | (0.0647) | (0.0979) |
| Canton: TG | 0.0287 | 0.0157 | -0.0315 | 0.0032 | 0.1306 | 0.1427* | 0.1072 | 0.1217 | 0.0687 | -0.1657* |
| | (0.0875) | (0.1708) | (0.1245) | (0.1057) | (0.0927) | (0.0853) | (0.0917) | (0.0903) | (0.0769) | (0.0955) |
| Canton: VD | -0.0198 | -0.1148 | -0.1152 | -0.1347** | -0.0817 | -0.0127 | -0.0182 | -0.0148 | -0.0710 | -0.1525 |
| | (0.0506) | (0.0913) | (0.0703) | (0.0596) | (0.0548) | (0.0549) | (0.0639) | (0.0613) | (0.0659) | (0.1039) |
| Canton: VS | 0.0374 | 0.0800 | 0.0661 | 0.0240 | 0.0437 | 0.1016 | 0.1334 | 0.0548 | 0.0099 | -0.1181 |
| | (0.0733) | (0.1298) | (0.0831) | (0.0783) | (0.0938) | (0.0946) | (0.0869) | (0.0655) | (0.0806) | (0.1198) |
| Canton: NE | -0.0231 | 0.0184 | -0.0531 | -0.0669 | -0.0275 | -0.0158 | -0.0404 | -0.0693 | -0.1504 | -0.1728 |
| | (0.0710) | (0.1264) | (0.1048) | (0.0954) | (0.0881) | (0.0838) | (0.0870) | (0.0904) | (0.1111) | (0.1508) |
| Canton: GE | -0.0864 | -0.1565 | -0.0269 | -0.1118* | -0.1067* | -0.1005 | -0.1435 | -0.0883 | -0.0562 | -0.0110 |
| | (0.0725) | (0.1344) | (0.0984) | (0.0639) | (0.0576) | (0.0691) | (0.0902) | (0.1006) | (0.1135) | (0.1666) |
| Canton: JU | -0.0052 | -0.0837 | 0.0326 | 0.0370 | 0.1368 | 0.2186 | 0.0730 | 0.0210 | -0.1493 | -0.1370 |
| | (0.1543) | (0.5143) | (0.3629) | (0.1999) | (0.1666) | (0.1481) | (0.1307) | (0.1345) | (0.1844) | (0.1947) |
| Constant | 7.7479*** | 4.6234** | 4.9540*** | 7.0562*** | 7.5709*** | 7.3281*** | 8.4974*** | 9.0566*** | 9.0925*** | 9.8955*** |
| | (0.7636) | (1.8497) | (1.3000) | (0.8623) | (0.7066) | (0.7567) | (0.7877) | (0.7175) | (0.7749) | (1.0542) |
| Observations | 2477 | 2477 | | | | | | | | |
| Adjusted $R^2$ | 0.510 | . | . | . | . | . | . | . | . | . |
| Pseudo $R^2$ | . | 0.27 | 0.32 | 0.35 | 0.36 | 0.37 | 0.38 | 0.38 | 0.39 | 0.36 |

Bootstrapped standard errors (200 replications) in parentheses, * p<0.10, ** p<0.05, *** p<0.010

| Elec. use (kWh) (ln) | OLS | QR | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | q10 | q20 | q30 | q40 | q50 | q60 | q70 | q80 | q90 |
| Gross income (ln) | 0.0081 | 0.0816 | -0.0000 | -0.0155 | -0.0235 | 0.0006 | 0.0051 | -0.0455 | -0.0318 | 0.0033 |
| | (0.0308) | (0.0578) | (0.0385) | (0.0308) | (0.0275) | (0.0309) | (0.0375) | (0.0395) | (0.0391) | (0.0468) |
| Elec. price (ln) proxy | -0.2074** | -0.1586 | -0.1667 | -0.0203 | -0.0895 | -0.0617 | -0.1894 | -0.2314** | -0.2674** | -0.2466* |
| | (0.0959) | (0.1918) | (0.1291) | (0.1144) | (0.1076) | (0.1078) | (0.1228) | (0.1135) | (0.1084) | (0.1488) |
| Year: 2016 | -0.0096 | -0.0416 | -0.0007 | 0.0038 | -0.0089 | -0.0189 | -0.0073 | -0.0289 | -0.0125 | 0.0061 |
| | (0.0310) | (0.0593) | (0.0365) | (0.0345) | (0.0349) | (0.0372) | (0.0369) | (0.0369) | (0.0407) | (0.0603) |
| Year: 2017 | -0.0432 | -0.0792 | -0.0507 | -0.0283 | -0.0123 | -0.0333 | -0.0250 | -0.0423 | -0.0084 | -0.0026 |
| | (0.0307) | (0.0641) | (0.0431) | (0.0391) | (0.0383) | (0.0347) | (0.0352) | (0.0367) | (0.0358) | (0.0462) |
| N of electronic devices | 0.0481*** | 0.0498*** | 0.0568*** | 0.0530*** | 0.0520*** | 0.0508*** | 0.0476*** | 0.0504*** | 0.0456*** | 0.0480*** |
| | (0.0047) | (0.0084) | (0.0070) | (0.0058) | (0.0054) | (0.0060) | (0.0057) | (0.0061) | (0.0066) | (0.0075) |
| Elec. for heating: yes | 0.2244*** | 0.0509 | 0.0610 | 0.1301** | 0.1658*** | 0.2097*** | 0.2470*** | 0.3352*** | 0.3640*** | 0.3791*** |
| | (0.0409) | (0.0878) | (0.0627) | (0.0588) | (0.0577) | (0.0546) | (0.0549) | (0.0501) | (0.0543) | (0.0663) |
| Elec. for water: yes | 0.2836*** | 0.1626** | 0.2396*** | 0.2589*** | 0.2902*** | 0.3221*** | 0.3365*** | 0.3368*** | 0.3420*** | 0.3501*** |
| | (0.0277) | (0.0701) | (0.0449) | (0.0400) | (0.0406) | (0.0418) | (0.0372) | (0.0353) | (0.0370) | (0.0426) |
| Electric car: yes | 0.1694** | 0.0139 | 0.1373 | 0.1582* | 0.1475 | 0.1260 | 0.1720** | 0.1602 | 0.2623* | 0.2878** |
| | (0.0793) | (0.2147) | (0.1211) | (0.0871) | (0.0909) | (0.0934) | (0.0864) | (0.1032) | (0.1489) | (0.1159) |
| Electric bike: yes | -0.0772** | -0.0025 | -0.0422 | -0.0499 | -0.0624* | -0.0748** | -0.0584 | -0.0888** | -0.0927** | -0.1184** |
| | (0.0308) | (0.0675) | (0.0410) | (0.0369) | (0.0345) | (0.0355) | (0.0371) | (0.0375) | (0.0408) | (0.0501) |
| 1 HH memb. | -0.1510*** | -0.1216* | -0.1908*** | -0.1639*** | -0.1698*** | -0.1564*** | -0.1786*** | -0.1698*** | -0.0973 | -0.1608* |
| | (0.0482) | (0.0714) | (0.0581) | (0.0550) | (0.0549) | (0.0558) | (0.0568) | (0.0657) | (0.0650) | (0.0899) |
| 3 HH memb. | 0.1132*** | 0.1243 | 0.1319*** | 0.1299*** | 0.1191*** | 0.1196*** | 0.1240** | 0.1255*** | 0.1123*** | 0.0498 |
| | (0.0410) | (0.1043) | (0.0486) | (0.0383) | (0.0393) | (0.0453) | (0.0503) | (0.0423) | (0.0425) | (0.0574) |
| >3 HH memb. | 0.2202*** | 0.3078*** | 0.2581*** | 0.2315*** | 0.2133*** | 0.2195*** | 0.1908*** | 0.2224*** | 0.2000*** | 0.1506** |
| | (0.0331) | (0.0751) | (0.0442) | (0.0405) | (0.0432) | (0.0424) | (0.0438) | (0.0450) | (0.0472) | (0.0590) |
| Age | 0.0208*** | 0.0239* | 0.0266*** | 0.0299*** | 0.0246*** | 0.0234*** | 0.0276*** | 0.0222** | 0.0151 | -0.0010 |
| | (0.0070) | (0.0129) | (0.0083) | (0.0086) | (0.0083) | (0.0085) | (0.0082) | (0.0095) | (0.0115) | (0.0149) |
| Age squared | -0.0001** | -0.0002 | -0.0002** | -0.0002*** | -0.0002** | -0.0001* | -0.0002** | -0.0001 | -0.0001 | 0.0001 |
| | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0001) | (0.0002) |
| Female | -0.0011 | -0.0515 | 0.0031 | 0.0119 | -0.0020 | 0.0076 | -0.0012 | -0.0188 | 0.0135 | 0.0534 |
| | (0.0317) | (0.0640) | (0.0480) | (0.0375) | (0.0381) | (0.0365) | (0.0385) | (0.0427) | (0.0418) | (0.0566) |
| Female x 1 HH memb. | -0.1286** | -0.1526 | -0.1488* | -0.1115 | -0.1102 | -0.1165* | -0.1122* | -0.1410* | -0.2273*** | -0.2506** |
| | (0.0545) | (0.1047) | (0.0830) | (0.0756) | (0.0683) | (0.0694) | (0.0674) | (0.0745) | (0.0777) | (0.1070) |
| Education: secondary | 0.0128 | -0.0063 | 0.0515 | 0.0537 | 0.0380 | -0.0113 | -0.0553 | -0.0083 | -0.0176 | 0.0349 |
| | (0.0457) | (0.0806) | (0.0587) | (0.0500) | (0.0570) | (0.0604) | (0.0546) | (0.0524) | (0.0555) | (0.0652) |
| Education: tertiary | 0.0221 | 0.0274 | 0.0629 | 0.0602 | 0.0360 | -0.0253 | -0.0534 | -0.0034 | -0.0049 | 0.0045 |
| | (0.0476) | (0.0803) | (0.0623) | (0.0505) | (0.0574) | (0.0593) | (0.0585) | (0.0570) | (0.0546) | (0.0659) |
| Foreigner | 0.0195 | -0.0968 | -0.0432 | -0.0401 | -0.0076 | -0.0561 | -0.0217 | 0.0819 | 0.0190 | 0.0974 |
| | (0.0477) | (0.0859) | (0.0616) | (0.0554) | (0.0525) | (0.0528) | (0.0750) | (0.0677) | (0.0680) | (0.1019) |
| Owner | 0.0696* | 0.1103* | 0.0774* | 0.1198*** | 0.0776** | 0.0505 | 0.0314 | 0.0076 | -0.0226 | -0.0268 |
| | (0.0387) | (0.0652) | (0.0457) | (0.0428) | (0.0382) | (0.0418) | (0.0395) | (0.0410) | (0.0432) | (0.0585) |
| Dwelling type: House | 0.4286*** | 0.3245*** | 0.3782*** | 0.3735*** | 0.3783*** | 0.4111*** | 0.4297*** | 0.4465*** | 0.4618*** | 0.5435*** |
| | (0.0358) | (0.0689) | (0.0494) | (0.0455) | (0.0427) | (0.0462) | (0.0419) | (0.0437) | (0.0531) | (0.0687) |
| Dwelling age | -0.0010*** | 0.0003 | -0.0003 | -0.0011** | -0.0010*** | -0.0010*** | -0.0013*** | -0.0014*** | -0.0013*** | -0.0015*** |
| | (0.0004) | (0.0007) | (0.0006) | (0.0005) | (0.0004) | (0.0003) | (0.0004) | (0.0004) | (0.0004) | (0.0005) |
| Dwelling size (ln) | 0.2429*** | 0.2330*** | 0.2787*** | 0.2934*** | 0.2827*** | 0.2824*** | 0.2536*** | 0.2423*** | 0.2724*** | 0.1719** |
| | (0.0405) | (0.0806) | (0.0638) | (0.0579) | (0.0522) | (0.0513) | (0.0553) | (0.0530) | (0.0522) | (0.0704) |
| Environmental attitude | -0.0232** | -0.0221 | -0.0240* | -0.0267** | -0.0183* | -0.0236** | -0.0176 | -0.0100 | -0.0100 | -0.0155 |
| | (0.0104) | (0.0182) | (0.0127) | (0.0114) | (0.0105) | (0.0098) | (0.0109) | (0.0125) | (0.0113) | (0.0182) |
| Altruistic attitude | 0.0140 | 0.0316 | 0.0144 | 0.0122 | 0.0072 | 0.0066 | 0.0026 | 0.0014 | 0.0041 | 0.0181 |
| | (0.0100) | (0.0220) | (0.0147) | (0.0124) | (0.0118) | (0.0122) | (0.0119) | (0.0125) | (0.0132) | (0.0197) |
| Social power | -0.0137 | -0.0287 | -0.0204 | -0.0092 | -0.0189* | -0.0088 | -0.0000 | -0.0011 | -0.0104 | -0.0027 |
| | (0.0100) | (0.0186) | (0.0127) | (0.0109) | (0.0112) | (0.0106) | (0.0114) | (0.0105) | (0.0112) | (0.0157) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hedonic attitude | -0.0027 | -0.0080 | -0.0051 | 0.0001 | 0.0050 | 0.0049 | 0.0056 | 0.0033 | -0.0002 | -0.0071 |
| | (0.0094) | (0.0181) | (0.0117) | (0.0103) | (0.0109) | (0.0119) | (0.0121) | (0.0128) | (0.0128) | (0.0169) |
| Price imputation: yes | 0.0462* | 0.0605 | 0.0206 | -0.0043 | -0.0284 | 0.0196 | 0.0353 | 0.0430 | 0.0609* | 0.1083** |
| | (0.0267) | (0.0651) | (0.0400) | (0.0360) | (0.0337) | (0.0343) | (0.0331) | (0.0327) | (0.0326) | (0.0459) |
| Occup. status: School student | 0.3653 | -0.6732 | 0.6377 | 0.4949 | 0.4575 | 0.7980 | 0.6983 | 0.6405** | 0.3889 | 0.4596 |
| | (0.4887) | (0.9057) | (0.9758) | (0.9674) | (0.7216) | (0.5260) | (0.4668) | (0.3261) | (0.3092) | (0.3326) |
| Occup. status: Student | -0.0002 | -0.0869 | -0.0235 | -0.0702 | -0.0001 | 0.0058 | -0.0658 | -0.0752 | 0.0061 | 0.1995 |
| | (0.0996) | (0.1871) | (0.1438) | (0.1153) | (0.1023) | (0.0848) | (0.0980) | (0.1284) | (0.1808) | (0.1861) |
| Occup. status: Apprentice | 0.0018 | -0.2622 | -0.5092 | 0.3575 | 0.1958 | 0.0771 | 0.1084 | 0.0481 | 0.2257 | -0.1514 |
| | (0.4111) | (0.6043) | (0.5948) | (0.5551) | (0.4903) | (0.4318) | (0.4257) | (0.3574) | (0.3393) | (0.3111) |
| Occup. status: Homemaker | 0.0920 | 0.1325 | 0.1899** | 0.1660*** | 0.1458** | 0.1295** | 0.1409** | 0.1002 | 0.1040 | 0.0613 |
| | (0.0570) | (0.1503) | (0.0910) | (0.0642) | (0.0604) | (0.0607) | (0.0604) | (0.0633) | (0.0708) | (0.0884) |
| Occup. status: Self-employed | 0.0263 | 0.0256 | 0.0281 | -0.0264 | -0.0105 | -0.0125 | -0.0076 | -0.0391 | -0.0892 | 0.0635 |
| | (0.0775) | (0.1240) | (0.0838) | (0.0690) | (0.0710) | (0.0832) | (0.0783) | (0.0691) | (0.0973) | (0.1609) |
| Occup. status: Entrepreneur | 0.0670 | 0.0770 | -0.0189 | -0.0473 | 0.0366 | 0.0657 | 0.0742 | 0.0649 | 0.1152 | 0.2114* |
| | (0.0727) | (0.1309) | (0.0813) | (0.0936) | (0.0928) | (0.0849) | (0.0741) | (0.0856) | (0.0853) | (0.1111) |
| Occup. status: Retired | 0.0532 | 0.1502 | 0.0894 | 0.0658 | 0.0393 | 0.0196 | 0.0792 | 0.0301 | -0.0293 | -0.0978 |
| | (0.0467) | (0.1033) | (0.0698) | (0.0592) | (0.0615) | (0.0590) | (0.0563) | (0.0591) | (0.0709) | (0.0973) |
| Occup. status: Unemployed | -0.0989 | -0.0356 | 0.0001 | 0.0288 | 0.0254 | -0.0665 | -0.0886 | -0.0556 | -0.1785 | -0.1139 |
| | (0.0980) | (0.3472) | (0.1296) | (0.0889) | (0.0814) | (0.0774) | (0.0839) | (0.0955) | (0.1139) | (0.1213) |
| Occup. status: Other | 0.0143 | -0.3935 | 0.0560 | -0.0028 | 0.1663 | 0.1054 | 0.2073* | 0.1588 | 0.1456 | 0.0909 |
| | (0.1340) | (0.3262) | (0.2457) | (0.1395) | (0.1531) | (0.1312) | (0.1146) | (0.1266) | (0.1352) | (0.1402) |
| Canton: BE | 0.0031 | 0.0207 | -0.0365 | -0.0671 | -0.0324 | -0.0674 | -0.0515 | 0.0096 | -0.0079 | -0.1269 |
| | (0.0490) | (0.0999) | (0.0664) | (0.0575) | (0.0467) | (0.0549) | (0.0601) | (0.0698) | (0.0620) | (0.0861) |
| Canton: LU | -0.0534 | -0.1389 | -0.1326 | -0.1204 | -0.0349 | -0.0397 | -0.0577 | -0.0714 | -0.0557 | -0.1511 |
| | (0.0627) | (0.1205) | (0.0921) | (0.0835) | (0.0781) | (0.0764) | (0.0743) | (0.0705) | (0.0735) | (0.0956) |
| Canton: UR | 0.3229* | 0.4545 | 0.1737 | 0.4020 | 0.4206** | 0.2347 | 0.1020 | 0.3566 | 0.3510 | 0.1818 |
| | (0.1753) | (0.2873) | (0.2585) | (0.2520) | (0.2126) | (0.2180) | (0.2332) | (0.2346) | (0.2323) | (0.2264) |
| Canton: SZ | 0.1271 | -0.0639 | 0.1746 | 0.2586* | 0.2766** | 0.2163** | 0.1841 | 0.1323 | 0.1350 | 0.0926 |
| | (0.1491) | (0.6967) | (0.2535) | (0.1450) | (0.1163) | (0.0946) | (0.1197) | (0.1320) | (0.1472) | (0.1949) |
| Canton: OW | -0.0905 | -0.6347 | -0.6916 | -0.5400 | 0.0490 | -0.1418 | -0.0624 | 0.3080 | 0.2854 | 0.1529 |
| | (0.2805) | (0.4203) | (0.5082) | (0.5058) | (0.4707) | (0.4072) | (0.4064) | (0.4143) | (0.3648) | (0.3017) |
| Canton: NW | -0.1063 | -0.3430 | 0.0812 | 0.0327 | 0.0799 | -0.0320 | 0.0140 | 0.0054 | -0.1845 | -0.4025** |
| | (0.1807) | (0.4859) | (0.4503) | (0.3323) | (0.2814) | (0.2254) | (0.1757) | (0.1362) | (0.1306) | (0.1612) |
| Canton: GL | 0.0849 | -0.3410 | 0.1529 | 0.0777 | 0.0816 | 0.0243 | -0.0213 | -0.0163 | 0.1931 | 0.3292 |
| | (0.1820) | (0.5967) | (0.3778) | (0.1495) | (0.1546) | (0.1582) | (0.1755) | (0.2246) | (0.2803) | (0.3342) |
| Canton: ZG | 0.0417 | -0.1057 | -0.0894 | 0.0260 | 0.1666* | 0.0733 | 0.0705 | 0.0608 | 0.1490 | 0.0034 |
| | (0.1158) | (0.1947) | (0.1522) | (0.1259) | (0.0968) | (0.0881) | (0.1083) | (0.1530) | (0.1650) | (0.1813) |
| Canton: FR | 0.1042 | 0.1850 | 0.1163 | 0.0961 | 0.1307* | 0.0546 | 0.0391 | 0.0023 | 0.0240 | -0.0515 |
| | (0.0722) | (0.1465) | (0.0879) | (0.0708) | (0.0695) | (0.0747) | (0.0782) | (0.0853) | (0.0972) | (0.1465) |
| Canton: SO | -0.0435 | -0.2991 | -0.2118 | -0.0836 | 0.0252 | 0.0102 | 0.0313 | 0.0065 | -0.0549 | -0.1860 |
| | (0.0855) | (0.1953) | (0.1838) | (0.1438) | (0.1087) | (0.1020) | (0.1004) | (0.0889) | (0.0906) | (0.1200) |
| Canton: BS | -0.0861 | 0.0272 | -0.1515 | -0.1336 | -0.1314 | -0.1063 | -0.1358 | -0.1959** | -0.1665* | -0.2984*** |
| | (0.0865) | (0.2035) | (0.0982) | (0.0889) | (0.0950) | (0.1017) | (0.0877) | (0.0857) | (0.0950) | (0.1078) |
| Canton: BL | -0.0075 | -0.1382 | -0.0223 | -0.0837 | 0.0238 | -0.0107 | 0.0234 | -0.0356 | -0.0579 | -0.1724 |
| | (0.0776) | (0.1637) | (0.1130) | (0.0963) | (0.0922) | (0.0912) | (0.0866) | (0.0774) | (0.0890) | (0.1327) |
| Canton: SH | 0.3336*** | 0.2228 | 0.2494* | 0.1342 | 0.3067 | 0.3787** | 0.2941*** | 0.2977*** | 0.1926* | 0.0222 |
| | (0.1101) | (0.1568) | (0.1311) | (0.1558) | (0.1878) | (0.1593) | (0.1081) | (0.1000) | (0.0988) | (0.1874) |
| Canton: AR | 0.0105 | -0.1787 | 0.1493 | 0.0048 | 0.0429 | 0.1763 | 0.1682 | 0.0788 | -0.0859 | -0.1542 |
| | (0.1977) | (0.6237) | (0.2933) | (0.2322) | (0.1922) | (0.2084) | (0.1866) | (0.1492) | (0.2305) | (0.4913) |
| Canton: AI | 0.2778** | 0.8849*** | 0.5017*** | 0.6256*** | 0.5157** | 0.3304* | 0.1786 | 0.0774 | 0.0017 | -0.3418* |
| | (0.1368) | (0.1726) | (0.1386) | (0.2035) | (0.2120) | (0.1843) | (0.1665) | (0.1351) | (0.1529) | (0.1826) |
| Canton: SG | 0.0252 | 0.0058 | -0.0226 | -0.0103 | 0.0545 | 0.0039 | -0.0018 | 0.0181 | 0.0172 | -0.0369 |
| | (0.0642) | (0.1862) | (0.0760) | (0.0653) | (0.0614) | (0.0640) | (0.0667) | (0.0703) | (0.0714) | (0.1242) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Canton: GR | 0.1764* | 0.0098 | 0.0502 | 0.0353 | 0.0229 | 0.1221 | 0.1081 | 0.1410 | 0.1839 | 0.2325 |
| | (0.0952) | (0.1479) | (0.1217) | (0.0846) | (0.0957) | (0.1210) | (0.1272) | (0.1351) | (0.1591) | (0.2130) |
| Canton: AG | 0.0960* | 0.0664 | 0.0518 | 0.0787 | 0.1558*** | 0.1030 | 0.0831 | 0.0792 | 0.0095 | -0.0432 |
| | (0.0552) | (0.1250) | (0.0675) | (0.0644) | (0.0604) | (0.0659) | (0.0658) | (0.0606) | (0.0655) | (0.0862) |
| Canton: TG | 0.0385 | -0.0266 | 0.0342 | 0.0458 | 0.1766* | 0.0968 | 0.0618 | 0.0979 | 0.0491 | -0.1435 |
| | (0.0824) | (0.2122) | (0.1421) | (0.1160) | (0.0907) | (0.0923) | (0.0973) | (0.0826) | (0.0746) | (0.1074) |
| Canton: VD | 0.0017 | -0.0522 | -0.0785 | -0.1152* | -0.0473 | -0.0350 | -0.0376 | -0.0298 | -0.0661 | -0.1455 |
| | (0.0458) | (0.1096) | (0.0673) | (0.0594) | (0.0577) | (0.0596) | (0.0616) | (0.0594) | (0.0632) | (0.1043) |
| Canton: VS | 0.0350 | 0.0362 | 0.0309 | 0.0306 | 0.0961 | 0.0498 | 0.0402 | 0.0365 | -0.0222 | -0.1063 |
| | (0.0720) | (0.1231) | (0.0834) | (0.0809) | (0.0929) | (0.0855) | (0.0967) | (0.0751) | (0.0724) | (0.1071) |
| Canton: NE | -0.0205 | 0.0059 | -0.0199 | -0.0720 | -0.0787 | -0.1084 | -0.1280 | -0.1323 | -0.1882 | -0.1463 |
| | (0.0713) | (0.1204) | (0.0964) | (0.0805) | (0.0791) | (0.0829) | (0.0833) | (0.0935) | (0.1349) | (0.1481) |
| Canton: GE | -0.0532 | 0.0168 | -0.1135 | -0.1201 | -0.0988 | -0.0915 | -0.1497 | -0.0922 | 0.0317 | 0.0616 |
| | (0.0704) | (0.1282) | (0.0768) | (0.0794) | (0.0680) | (0.0753) | (0.0960) | (0.1296) | (0.1297) | (0.1712) |
| Canton: JU | 0.0214 | 0.0869 | 0.1178 | 0.0114 | -0.0236 | -0.0117 | 0.0300 | -0.0596 | -0.1920 | -0.0498 |
| | (0.1611) | (0.5576) | (0.3058) | (0.1322) | (0.1448) | (0.1566) | (0.1312) | (0.1359) | (0.1570) | (0.2207) |
| Constant | 7.3731*** | 3.7260** | 5.4549*** | 6.7407*** | 7.1205*** | 7.0711*** | 8.0645*** | 8.9510*** | 9.0192*** | 10.0189*** |
| | (0.7867) | (1.6493) | (1.3560) | (1.0194) | (0.8335) | (0.7920) | (0.8310) | (0.8276) | (0.8019) | (0.9725) |
| Observations | 2479 | 2479 | | | | | | | | |
| Adjusted $R^2$ | 0.501 | . | . | . | . | . | . | . | . | . |
| Pseudo $R^2$ | . | 0.27 | 0.32 | 0.34 | 0.35 | 0.36 | 0.37 | 0.37 | 0.38 | 0.36 |

Bootstrapped standard errors (200 replications) in parentheses, * p<0.10, ** p<0.05, *** p<0.010