

Farsi, Mehdi; Péclat, Martin; Puntiroli, Michael; Weber, Sylvain

Working Paper

Energy cultures and language border in Switzerland

IRENE Working Paper, No. 25-01

Provided in Cooperation with:

Institute of Economic Research (IRENE), University of Neuchâtel

Suggested Citation: Farsi, Mehdi; Péclat, Martin; Puntiroli, Michael; Weber, Sylvain (2025) : Energy cultures and language border in Switzerland, IRENE Working Paper, No. 25-01, University of Neuchâtel, Institute of Economic Research (IRENE), Neuchâtel

This Version is available at:

<https://hdl.handle.net/10419/315041>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



Energy cultures and language border in Switzerland

Mehdi Farsi, Martin Péclat, Michael Puntiroli, and Sylvain Weber

Energy cultures and language border in Switzerland*

Mehdi Farsi[†] Martin Péclat[‡] Michael Puntiroli[†]
Sylvain Weber[§]

March 15, 2025

Abstract

Energy cultures, broadly defined as shared beliefs, practices, and material preferences that shape energy-related behaviors, provide a useful framework for investigating consumption differences across population groups. We investigate how households' energy demand behavior differ across the French-German language border in Switzerland. Our empirical strategy focuses on a regression discontinuity design, leveraging the clear separation created by the language border. We distinguish between two types of behavior, one linked to mobility and another to electricity consumption. Our results indicate that electricity consumption is relatively stable across the border. On the other hand, households residing in the French-speaking region show on average a greater usage of own vehicle, measured by annual distance traveled. This difference remain significant across the language border, suggesting that cultural elements could drive meaningful differences in private car travel. While we do not find evidence for energy culture differences in electricity demand, our results point to distinct energy cultures with regards to car usage, therefore in the mobility domain.

JEL Classification: C24, R23, R41, Q40.

Keywords: Energy culture, Household energy demand, Electricity usage, Mobility, Correlated random effects, Regression discontinuity design.

*This research has benefited from the financial support of Innosuisse under SCCER CREST, and the Swiss Federal Office of Energy as a part of the SWEET CoSi consortium. A preliminary version of this paper was presented at the 1st *Swiss workshop on Environmental, Resource and Energy Economics* (SERE 2023). We thank the participants for constructive discussion.

[†]University of Neuchâtel, Institute of economic research.

[‡]Romande Énergie SA.

[§]University of Applied Sciences Western Switzerland (HES-SO), Haute école de gestion de Genève (HEG), sylvain.weber@hesge.ch.

1 Introduction

Transitioning to a zero-carbon economy requires not only technological advancements and market shifts but also societal changes deeply influenced by culture. Cultural diversity presents a fascinating yet complex realm when viewed through the lens of energy consumption. While it is understood that values and attitudes at a psychological level can influence behavior, the translation of these subtle cultural nuances into distinct energy consumption patterns is not well-charted territory. While relying primarily on technological developments and market drivers, transition to a zero-carbon economy also depends on societal changes related to culture. Both supply pushes and demand pulls are in fact dependent on consumers' willingness to adopt new technologies such as electric vehicles, as well as their acceptance of and reaction to policy measures and infrastructure developments such as carbon taxation and wind turbines. At the household level, many of these developments call for new "production/consumption cultures", or what is often referred to as energy cultures. Households' energy use and the equipment they choose for producing energy services reflect the influence of lifestyle and social practices on overall energy demand. In this light, [Stephenson \(2018\)](#) defines an energy culture as the cultural formation with a causal effect on some energy outcomes.

Cultural differences manifest in social practices, and hence could influence various economic outcomes. However, linking these differences to cultural exponents is an empirical challenge subject to a growing interdisciplinary literature. Within-country language borders could provide a natural experiment, where cross-border differences occur under similar economic factors. In particular, the border between French and German-speaking regions in Switzerland has been studied as a chasm between two distinct cultures, showing significant differences in taxation preferences and public goods ([Eugster and Parchet, 2019](#)), employment search time ([Eugster et al., 2017](#)), reactions to government measures against pandemics ([Deopa and Fortunato, 2020](#); [Mazzonna, 2020](#)), and demand for energy-efficient vehicles ([Filippini and Wekhof, 2021](#)). In line with this literature, the present paper examines possible differences in energy demand behaviors between the two groups of the Swiss population. Similar to those studies, the focus is on differences that can

be causally linked to the language border. This paper differs however from previous studies in that it seeks to identify a “real” cultural difference with theoretical underpinning. In particular, we follow [Stephenson et al.](#)’s theoretical framework “energy cultures” ([Stephenson et al., 2010, 2015](#); [Stephenson, 2018](#)) in order to test if the French-German language border in Switzerland can be identified as an energy cultural border.

Previous studies provide evidence of cultural differences across the French-German language border, which can be directly related to various norms and life-style preferences. It is however less clear if these differences can be associated to distinct energy cultures as defined above. In other words, do these existing cultural differences have real consequences in energy outcomes or are they merely demographic and psychological differences that do not translate to behavioral differences? This paper attempts to disentangle the energy-relevant cultural differences from those differences that cannot be considered as variations in energy cultures. Our identification strategy relies on two postulates. First, genuine differences in energy cultures have a causal effect on household’s energy-related choices. That is, in similar contexts with comparable external factors, such as existing infrastructure, green initiatives, environmental constraints and overall quality of life, energy-related outcomes differ across the cultural chasm. Second, these differences are beyond social and material preferences in that they bring about significant consequences in energy demand.

Insights to different energy cultures help policy makers to adapt their promotion campaigns to each cultural group. Energy demand differences can also be used to identify low-hanging fruits, that is, the cultural groups that are the most easily amenable to behavioral changes facilitating energy transition. Thus, the paper’s objective is twofold. First, focusing on households in comparable environments, we aim to identify cultural differences between the two population groups. Second, we test if these cultural differences are associated with significant variation in household energy demand. The mobility domain is an interesting example with cultural aspects. Decisions regarding car ownership and travel modes, while having a potentially important relation with social aspirations and personal norms, could significantly affect energy outcomes. Whether or not these cultural differences

lead to energy demand differences remains however an empirical question. Strong hedonistic preferences could for instance favor usage of private vehicles as opposed to public transport, hence higher energy demand, but could also be associated with adoption of cars with greater fuel efficiency, offsetting the resulting energy consumption. Similarly, strong environmental values are probably associated with specific preferences, for instance in voting and political orientation, but the impact on the household's energy consumption necessitates an individual behavior aligned with those preferences.

We use a longitudinal survey to examine differences in a series of energy consumption behaviors as well as norms and environmental attitudes. The data is an unbalanced panel of about 28,000 observations over a six-year period from 2016 to 2021. Drawing upon psychological and sociological literature, we focus on measures of personal norms, environmental values and life-style preferences. As for energy behavior, we examine variables measuring demand for electricity and driving distance, as well as the fuel efficiency of the household's main vehicle. We use a Regression Discontinuity Design (RDD) relying on the French-German language border in Switzerland. Our findings indicate significant differences in several cultural attributes between the two groups, suggesting distinct energy cultures across the language border. While the differences appear to be significant in the choice of private vehicle and its usage, there is no evidence of any significant difference in other energy consumption behaviors. These results suggest that energy cultures are significant in certain contexts such as driving, in which energy consumption entails visibility and comfort. We use the results to provide guidance in tailoring energy transition policies to cultural tendencies in different population groups.

The remainder of this paper is structured as follows. Section 2 provides a brief review of literature and motivates the analysis. Section 3 presents the data available to us. Section 4 outlines our econometric strategy and Section 5 discusses the empirical results. Section 6 provides a summary and concludes.

2 Background

Cultural differences exist between groups of people from different languages, geographical locations, or who belong to different business organizations. Interestingly, ‘culture’ is seen as the key variable, encompassing all these components, responsible for substantial behavioral impact, e.g., individual employees behaving differently in different organizations (Hofstede, 1984). Studies on cultural differences have often focused on how individuals within groups, organizations and countries create a common culture through language and shared values. For example, the organizational culture that exists within organizations is closely linked to the behavioral practices governing the lives of individual members, such as their attitudes towards those in charge and their level of cooperation (Hofstede, 1998). The emphasis on behavioral practices as an essential component of culture can also be seen in more recent studies (Shove et al., 2009; Stephenson et al., 2010; Stephenson, 2018). In particular, Stephenson et al. (2015) propose a theoretical framework for defining ‘energy cultures’, which encompasses cultural features relevant to a wide range of ‘energy behaviors’ ranging from energy demand to purchase or investment decisions. These features are mainly but not exclusively based on three components, namely: material culture, norms, and practices. In a similar vein, Shove et al. (2015) propose a conceptual basis drawn from social theory to link energy demand to an interconnected web of social practices.

Cultural differences may be important in the context of the energy transition, where households constitute a natural candidate for interventions designed to reduce global energy consumption. Households can be directly imputed a considerable share of final energy demand,¹ and they moreover constitute a significant determinant for firms’ energy demand, let alone government and corporate practices. Nevertheless, the impact of any intervention is potentially modulated by various cultural attributes such as social norms and individual practices. In particular, cultural elements may play a role in shaping energy-relevant preferences and behaviors such as rebound responses (Sorrell and Dimitropoulos, 2008; Weber

¹Households are responsible for more than a quarter of final energy demand (excluding transportation) in Switzerland (SFOE, 2021).

and Farsi, 2014; Hediger et al., 2018), energy-efficiency investments (Allcott and Greenstone, 2012), and individual time and risk preferences (Farsi, 2010; Newell and Siikamäki, 2015). Further, accounting for cultural differences is essential in designing interventions for promoting sustainable energy practices such as energy conservation initiatives. As pointed out by Ho (2015), adapting these campaigns to specific cultural dynamics and life styles helps avoid the risk of alienating individuals by targeting a single cultural mindset.

Empirical studies in fact suggest a robust relationship between individual energy behaviors and cultural attributes. These attributes, ranging from social practices (Shove et al., 2015) and conspicuous consumption (Wilhite et al., 2000) to affect (Hahnel and Brosch, 2018) and personal norms (Hille et al., 2019), are found to be potentially important predictors of various energy behaviors. While cultures have been shown to differ with regards to sustainability beliefs and their openness to sustainability-related initiatives (Tata and Prasad, 2015), there is still a dearth of information about how cultures concretely influence energy behaviors, which could be considered even more important than the psychological components that precede them. Energy behaviors related to mobility have a special place in energy-cultural studies. While notions such as ‘car culture’, ‘auto-mobility freedom’ and ‘car dependence’ are not new to anthropological studies (Miller, 2001), studying their link with energy demand has emerged only recently. For instance, applying their conceptual framework to auto-mobility, Shove et al. (2015) highlight the symbolic status of car in contemporary cultures and the integration of driving in a wide range of social practices such as commuting, shopping and entertainment. Moreover, mobility-related behaviors have attracted much policy attention mainly because they are considered to have the greatest environmental impact among behaviors over which an individual has control (Wynes and Nicholas, 2017).

Since the earlier strands of culture-behavior studies, language has been considered as the main vehicle of cultural variations as well as the principal identifier of cultural groups (Hofstede, 1984). Thus considered as a driver of cultural attributes, language lends itself to a convenient and observable proxy for both theory building and empirical analysis. Linguistic variations in otherwise similar economic and institutional contexts can be used to link differences in economic and social outcomes

to culture ([Mavisakalyan and Weber, 2018](#)). An interesting example is provided by linguistic variations in Switzerland, where the high frequency of voting has allowed a large body of literature associating political and environmental orientations to cultural differences. Moreover, a number of empirical studies have used differences across language borders to test whether culture matters in creating different behaviors. Switzerland, with its four national languages, can therefore be considered as a laboratory to investigate cultural differences.²

The four languages are spoken in relatively homogeneous and distinct regions whose borders have remained very stable since the 18th century. In particular, the cultural differences between French- and German-speaking regions of Switzerland have been subject to a number of empirical studies (e.g., [Eugster and Parchet, 2019](#); [Deopa and Fortunato, 2020](#); [Filippini and Wekhof, 2021](#)). The language border between these two regions crosses the country from north to south over about 270 km, without following any natural barriers. In addition, the French-German border does not coincide with jurisdictional boundaries for nearly half of its length, across three bilingual Swiss cantons – Bern, Fribourg and Valais – that include both linguistic groups. These characteristics suggest that demographic, topographical and institutional discontinuities can be excluded at least locally, around the border, thus making it particularly interesting for analyzing the impact of culture.

Popular media have often pointed to strong cultural differences between the French- and German-speaking regions of Switzerland, in terms of how they view governmental advice, their levels of trust and their sense of individual responsibility. For instance, an article about various responses to Covid-19 restrictions states that “French-speaking Switzerland refers more willingly to France and its centralist, state-driven model, while Swiss-German regions are closer to federal Germany... France is largely built on a top down model – a strong authority seen as a necessity, a structuring force, which may be feared, but where people have great expectations... while in Germany it’s more bottom up.” ([SWI, 2020](#)) The media attention is also drawn on voting patterns across the language and cantonal di-

²In 2020, 62% of the Swiss population use German (or a German dialect) as a main language, 23% French, 8% Italian, and less than 1% Romansh (see [SFSO, 2022](#)).

vides. In terms of voting patterns, [Koseki \(2018\)](#) however suggests that the large distinction between rural and urban locations is the major source of division that overwhelmingly dominates the differences between French and German-speaking regions. This is particularly important as the opinion polls reported in popular media usually do not control for other variations such as urban-rural locations, hence could give a biased picture of cultural variations. Studying the variations across the language border allows a controlled comparison between comparable households from the two groups.

Among the studies focusing on the French-German cultural contrast in Switzerland, several findings point to various economic outcomes that are directly or indirectly related to energy behaviors. In particular, [Eugster and Parchet \(2019\)](#) identify differences in taxation preferences and public goods provision, and [Eugster et al. \(2017\)](#) show a significant difference in employment search time along the language border. Analyses by [Deopa and Fortunato \(2020\)](#); [Mazzonna \(2020\)](#) find that cultural differences also affected the reactions to measures implemented by the Swiss government to fight Covid-19. More recently, [Filippini and Wekhof \(2021\)](#) find that French-speaking municipalities have a share of energy-efficient vehicles that is 3-6% higher than their German-speaking counterparts, thereby showing that cultural differences affect preferences regarding energy and environment.

In this paper, we investigate how electricity usage and mobility patterns vary across the French- and German-speaking regions of Switzerland. Our focus is on energy outcome differences caused by cultural attributes, abstracting from economic factors such as income, education, and household size. A contrasting example is provided by [Lyubich \(2020\)](#), whose findings based on comparison of black and white households in the US can be related to economic determinants of investment rather than culture. Other non-cultural factors might drive differences in energy behaviors. For instance, labor market integration across the French-German border in Switzerland might require a relatively longer average commuting distance for households living close to the border. This in combination with different job attitudes ([Eugster et al., 2017](#)) might imply longer commuting distance for the group with a higher willingness to be mobile. By our definition, these energy-demand differentials are not cultural because they apply in some narrow contexts.

Conversely, the differences in taxation preferences and public goods reported in [Eugster and Parchet \(2019\)](#) are directly related to energy behavior. The group favoring those aspects is more likely to support (e.g., vote for) policy measures in favor of conservation and energy efficiency. It is however important to note that whether this political tendency is combined with an individual energy-saving behavior remains an empirical question (which is addressed in this paper).

Following a selection of empirical studies ([Eugster et al., 2017](#); [Hahnel and Brosch, 2018](#)), we consider a number of cultural attributes that can be grouped in three categories, in line with the energy culture framework proposed by [Stephenson et al. \(2015\)](#), namely, norms, material culture, and practices. Norms are shared beliefs about how people should behave in a given context, and they can be differentiated between expectations (current practices and material culture) and aspirations (what people consider desirable but have not yet realized). Material culture refers to the physical evidence of culture, including objects, buildings, and infrastructure, which can have functional and symbolic qualities. Practices are the customary actions or routines that people engage in, from everyday habitual activities to less frequent actions such as choosing and acquiring material objects. The framework differentiates between practices and material culture, while recognizing that these are strongly interrelated.

In the context of the energy cultures framework, these three elements interact with each other to shape energy usage patterns, with cultural factors playing a critical role in determining how energy is used and how it is valued by individuals and societies. By analyzing these three elements, researchers can gain insight into the complex interplay between culture, technology, and energy use, which can be useful for developing policies and strategies that promote sustainable energy practices.

In particular, we focus on three indicators of trust in public authorities, and four measures of core values, i.e., egoistic, altruistic, biospheric, and hedonistic values ([Steg et al., 2014](#)). We also include two practice measures for usage of public transport and home appliances, and two proxies for material culture, that is, fuel-efficient car ownership and the share of energy-efficient appliances in the household.

Finally, the outcome variables of interest are the household’s electricity consumption and their private car usage.

3 Data

Our main data source is the Swiss Household Energy Demand Survey (SHEDS), an online survey that focuses on energy-related behaviors of Swiss households. It has been carried out annually from 2016 to 2021, each wave being based on a sample of 5,000 respondents representative of the Swiss population (excluding Ticino).³ In particular, the survey requires respondents to provide information regarding electricity and transportation usage. For electricity, we focus on the household’s annual consumption (in kilowatt-hours, kWh), which is copied from the provider’s bill by most respondents. Regarding private transportation, we obtain two measures. First, annual distance is self-stated by the respondents on a scale from 5,000 to 50,000 kilometers.⁴ Second, we compute annual distance traveled as the difference observed between two consecutive odometer readings.⁵

3.1 Language border

We identify the respondent’s cultural group on the basis of their municipality according to their reported ZIP code.⁶ The language region to which a municipality belongs is defined by the Swiss Federal Statistical Office (SFSO), according to the

³More details about SHEDS are available in [Weber et al. \(2017\)](#) and [Farsi and Weber \(2024\)](#).

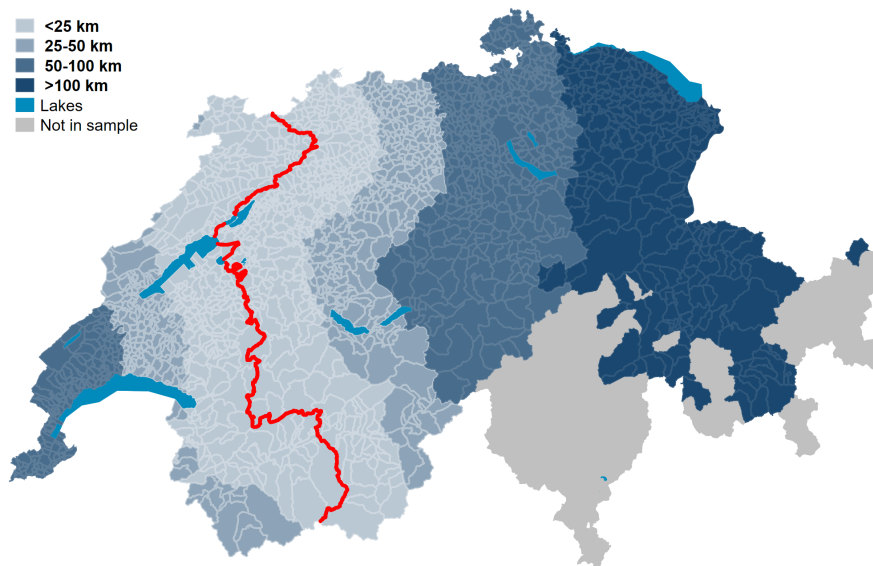
⁴The exact question is “On average, how many kilometers do you drive per year using [your] car?”. Possible answers are “up to 5,000”, “up to 10,000”, ..., “up to 50,000”, “more than 50,000”, or “I do not know”. This question was introduced in wave 2017 of SHEDS.

⁵The survey question we use is “Currently, how many kilometers does the odometer of the car read? Give your best estimation.” Of course, we need two survey waves for constructing a single observation of this distance measure so that the sample will be smaller in that case, and we lose the first year of the panel.

⁶ZIP codes are issued by Swiss Post and their areas do not necessarily correspond to political boundaries. When a SHEDS respondent provides a ZIP code used in two or more municipalities, we select the one that constitutes the largest share in terms of number of buildings.

main language most often declared in the population.⁷ For each municipality, we moreover compute the distance as the crow flies from the nearest point on the language border to the center of that municipality, as determined by SFSO's centre of competence for geoinformation GEOSTAT. To investigate the impact of cultural differences, we restrict the sample to households living in the French- and German-speaking regions of Switzerland. Figure 1 shows the municipalities that are used (in blue) and how Switzerland is split from north to south by the language border. It also illustrates the various bandwidths considered in our analysis.

Figure 1: Distance from municipality center to language border



Note: The red line shows the language border between the French- (West) and the German-speaking (East) parts of Switzerland. The distances, represented by variations in blue, are calculated as the crow flies between the center of the municipalities and the nearest point on the language border. Sources of data: swissBOUNDARIES3D (Federal Office of Topography swisstopo) for the boundaries of administrative units and GEOSTAT (Swiss Federal Statistical Office) for geographic information.

⁷See the Swiss official commune register at <https://www.bfs.admin.ch/bfs/en/home/basics/swiss-official-commune-register.html>.

3.2 Household’s language

SHEDS is conducted in three languages: French, German, and English. Table 1 presents the distribution of observations based on municipality language versus respondent’s language used in the survey. Few respondents (less than 3% of the sample) are located in a region where local language is different from the language used to answer the survey.⁸ It is difficult to assign such respondents to a specific cultural group, and we therefore discard them from our sample. For consistency, we also exclude 46 households (representing 173 observations) who moved across language regions during the observation period. In so doing, we take advantage of our household-level data, which gives us the opportunity to transform a fuzzy design into a sharp design. In a fuzzy design, some observations do not comply with the “treatment” they are assigned. In our context, “noncompliers” are the respondents who live on one side of the border but in fact belong to the other cultural group as revealed by their own language. With municipality-level data, detecting such observations is not feasible and one has to implement a fuzzy regression discontinuity design (as in [Filippini and Wekhof, 2021](#), for instance). Our multilingual survey enables the identification of “noncompliers,” and excluding these observations results in a sharp design.

The final sample covers 11,462 households who completed the survey at least once. The number of observations per household varies from 1 to 6, with an

Table 1: Number of observations in original dataset, by language

Municipality language	Respondent’s language			
	French	German	English	Total
French	7,161	136	30	7,327
German	315	21,254	397	21,966
Total	7,476	21,390	427	29,293

Note: All SHEDS respondents from the French- and German-speaking regions.

⁸These also include about 1.5% of the respondents who complete the survey in English.

average of 2.5. As shown in Table 2, our unbalanced panel dataset contains 28,316 household-year observations. About a quarter of these observations correspond to households living in the French-speaking region of Switzerland (the “treatment” group), while the remaining three quarters are from the German-speaking region (the “control” group).

Table 2: Number of observations and municipalities in final dataset, by language and year

Year	French			German			Total		
	# Obs	(% Obs)	# Mun	# Obs	(% Obs)	# Mun	# Obs	(% Obs)	# Mun
2016	1,191	(24.92)	301	3,589	(75.08)	787	4,780	(100.00)	1,088
2017	1,209	(25.08)	295	3,611	(74.92)	781	4,820	(100.00)	1,076
2018	1,203	(25.00)	304	3,609	(75.00)	802	4,812	(100.00)	1,106
2019	1,205	(24.87)	306	3,640	(75.13)	828	4,845	(100.00)	1,134
2020	1,237	(25.38)	290	3,637	(74.62)	791	4,874	(100.00)	1,081
2021	1,054	(25.19)	292	3,131	(74.81)	761	4,185	(100.00)	1,053
Total	7,099	(25.07)	426	21,217	(74.93)	1,061	28,316	(100.00)	1,487

Note: SHEDS respondents whose language corresponds to that of the region (see text for the exact selection criteria). For municipalities, numbers indicate how many different municipalities are concerned. Totals therefore do not correspond to the sum of yearly numbers.

3.3 Descriptive statistics

Table 3 presents descriptive statistics by linguistic region as defined above. The Table also lists the mean differences across the language border and their statistical significance on a highly aggregated level between French- and German-speaking regions. We classify variables into four categories to emphasize that there are various types of energy consumption determinants, some of which are under the control of individuals but not all. Socio-demographic and structural determinants are expected to have an impact on energy consumption, but only indirectly and without being chosen by the individuals. These can be considered as framework conditions shaping or constraining energy consumption. Technical determinants are related to the number and the type of devices owned by the households. As durable goods, technical determinants can only be changed over the long run. Contrarily, behavioral determinants are directly under the control of individuals and can be more easily changed. Finally, psychological determinants are related to norms, values, and attitudes of the individuals.

As can be seen in Table 3, many variables show significant differences between the two language groups. The distance from home to work might be an important determinant for distance traveled annually. Also, because cities are distributed differently in the French- and German-speaking regions, this might play a role in transport decisions. We therefore compute the travel distance (by car) between the municipalities where respondents live and work using Stata command `georoute` (see [Weber and Péclat, 2017](#); [Weber et al., 2022](#)). We observe that French-speaking households live on average closer from their work place (11.4 km) than German-speaking households (13.5 km).

We use these significant differences as a guide for selecting the variables of interest. Later in the paper however, we will analyze local discontinuities, focusing on specific bandwidths around the language border.

Table 3: Summary statistics, by linguistic region

	French-speaking			German-speaking			Difference	
	Mean	(SD)	N	Mean	(SD)	N	Mean	[SE]
DEPENDENT VARIABLES								
Electricity consumption (kWh/year)	3,868.98	(3,851.99)	2,720	3,986.83	(3,724.55)	8,999	-117.85	[82.15]
Driving distance (km/year)	12,879.52	(8,842.12)	4,532	11,740.48	(8,544.19)	12,396	1,139.04***	[149.72]
Driving distance (km/year) (from odometer readings)	18,617.13	(22,165.19)	2,200	17,116.88	(20,791.67)	6,564	1,500.25***	[520.91]
SOCIO-DEMOGRAPHIC AND STRUCTURAL DETERMINANTS								
Number of HH members	2.33	(1.31)	7,099	2.32	(1.62)	21,217	0.02	[0.02]
Man in single person HH	0.12	(0.32)	7,099	0.11	(0.31)	21,217	0.01**	[0.00]
Woman in single person HH	0.17	(0.38)	7,099	0.17	(0.37)	21,217	0.00	[0.01]
m ² /HH member	55.57	(36.12)	6,938	61.27	(35.67)	20,825	-5.70***	[0.50]
Tenant or living in coop.	0.64	(0.48)	7,099	0.63	(0.48)	21,217	0.01	[0.01]
Living in a house	0.31	(0.46)	7,099	0.37	(0.48)	21,217	-0.06***	[0.01]
Home to work travel distance	11.37	(23.48)	6,359	13.46	(24.60)	17,581	-2.09***	[0.36]
Space heating: electricity	0.09	(0.28)	7,099	0.05	(0.22)	21,217	0.04***	[0.00]
Water heating: electricity	0.16	(0.36)	7,099	0.21	(0.41)	21,217	-0.05***	[0.01]
Space heating: heat pump	0.11	(0.31)	7,099	0.17	(0.37)	21,217	-0.06***	[0.00]
Income CHF 3,000-4,499	0.11	(0.32)	6,445	0.09	(0.29)	19,273	0.02***	[0.00]
Income CHF 4,500-5,999	0.16	(0.36)	6,445	0.15	(0.36)	19,273	0.01	[0.01]
Income CHF 6,000-8,999	0.29	(0.46)	6,445	0.29	(0.45)	19,273	0.01	[0.01]
Income CHF 9,000-12,000	0.21	(0.41)	6,445	0.23	(0.42)	19,273	-0.02***	[0.01]
Income > CHF 12,000	0.14	(0.35)	6,445	0.18	(0.39)	19,273	-0.04***	[0.01]
University degree	0.50	(0.50)	7,098	0.44	(0.50)	21,211	0.06***	[0.01]
Checked bill info	0.62	(0.49)	5,276	0.65	(0.48)	16,160	-0.03***	[0.01]
ln(Price of 1 kWh)	2.99	(0.36)	7,099	2.91	(0.38)	21,217	0.08***	[0.01]
Time-of-use tariff	0.56	(0.50)	4,713	0.85	(0.36)	17,214	-0.29***	[0.01]
TECHNICAL DETERMINANTS								
Number of fridges	1.12	(0.43)	6,751	1.11	(0.38)	20,303	0.01**	[0.01]
Number of freezers	0.66	(0.63)	6,870	0.70	(0.62)	20,614	-0.04***	[0.01]
Number of TVs	1.17	(0.75)	7,099	1.18	(0.77)	21,217	-0.01	[0.01]
Number of computers	0.60	(0.75)	7,099	0.64	(0.77)	21,217	-0.04***	[0.01]
Number of laptops	1.34	(0.97)	7,099	1.36	(1.00)	21,217	-0.01	[0.01]
Number of tablets	0.91	(0.89)	7,099	0.90	(0.90)	21,217	0.02	[0.01]
Share of A+++ or A++	0.56	(0.37)	5,945	0.62	(0.35)	18,371	-0.07***	[0.01]
New renewables in electricity mix	0.23	(0.42)	7,099	0.23	(0.42)	21,217	0.00	[0.01]
BEHAVIORAL DETERMINANTS								
# of GA travel cards	0.27	(0.63)	7,099	0.45	(0.81)	21,217	-0.18***	[0.01]
# of half-fare travel cards	0.85	(0.89)	7,099	1.02	(0.91)	21,217	-0.17***	[0.01]
# of regional travel cards	0.35	(0.66)	7,099	0.34	(0.64)	21,217	0.01	[0.01]
# of cars	1.15	(0.83)	7,099	1.02	(0.87)	21,217	0.13***	[0.01]
# of motorbikes	0.22	(0.54)	7,099	0.21	(0.54)	21,217	0.01*	[0.01]
# of bikes	1.30	(1.54)	7,099	1.95	(1.76)	21,217	-0.65***	[0.02]
# of e-bikes	0.16	(0.46)	7,099	0.26	(0.60)	21,217	-0.10***	[0.01]
Car consumption (L/100km)	7.74	(8.92)	5,361	7.72	(12.46)	14,566	0.02	[0.19]
A or B label car	0.25	(0.43)	5,626	0.25	(0.43)	15,232	0.00	[0.01]
Unknown car energy label	0.51	(0.50)	5,626	0.56	(0.50)	15,232	-0.05***	[0.01]
At least one e-bike	0.12	(0.33)	7,099	0.19	(0.39)	21,217	-0.07***	[0.01]
Electricity saving habits	3.59	(1.16)	6,439	3.34	(1.19)	19,373	0.25***	[0.02]
Usage/week: dishwasher	2.89	(2.58)	7,099	3.10	(2.65)	21,217	-0.21***	[0.04]
Usage/week: wash. machine	2.16	(2.27)	7,099	2.35	(2.31)	21,217	-0.19***	[0.03]
Usage/week: dryer	1.14	(1.87)	7,099	1.12	(1.76)	21,217	0.02	[0.02]
Usage/week: oven	2.64	(2.20)	7,099	2.25	(1.88)	21,217	0.39***	[0.03]
Switch off frequency (1)	2.45	(0.59)	7,079	2.43	(0.60)	21,153	0.02***	[0.01]
Switch off frequency (2)	1.65	(0.66)	7,065	1.57	(0.64)	21,122	0.08***	[0.01]
Car from home to work	0.32	(0.47)	7,099	0.25	(0.43)	21,217	0.06***	[0.01]
Car for leisure activities	0.57	(0.49)	7,099	0.43	(0.49)	21,217	0.14***	[0.01]
Electric car	0.03	(0.16)	5,626	0.03	(0.16)	15,232	0.00	[0.00]
PSYCHOLOGICAL DETERMINANTS								
Positive outcome	4.01	(0.90)	7,077	3.93	(0.82)	21,132	0.08***	[0.01]
Negative outcome	3.54	(0.96)	7,077	3.48	(0.91)	21,132	0.06***	[0.01]
Coercion affect	2.58	(0.99)	7,077	2.67	(0.96)	21,132	-0.09***	[0.01]
Intent to reduce electricity	3.10	(1.06)	6,736	2.83	(1.08)	20,296	0.28***	[0.02]
Intent to reduce carbon	3.23	(1.05)	6,736	2.96	(1.09)	20,296	0.27***	[0.02]
Perceived injunctive norms	3.41	(1.02)	7,099	3.14	(0.98)	21,217	0.28***	[0.01]
Descriptive norms	3.33	(0.96)	7,099	3.21	(0.93)	21,217	0.12***	[0.01]
Personal norms	3.79	(1.10)	7,099	3.95	(0.95)	21,217	-0.16***	[0.01]
Energy literacy score	3.32	(1.31)	7,099	3.54	(1.28)	21,217	-0.21***	[0.02]
Trust: SFOE	3.84	(1.01)	6,715	3.75	(1.01)	20,216	0.09***	[0.01]
Trust: local authorities	3.57	(1.02)	6,720	3.44	(1.00)	19,532	0.13***	[0.01]
Trust: local utility	3.42	(1.07)	6,772	3.55	(1.02)	20,142	-0.13***	[0.01]
Advice: SFOE	0.11	(0.32)	7,058	0.40	(0.49)	21,063	-0.29***	[0.01]
Advice: local authorities	0.06	(0.24)	7,058	0.12	(0.33)	21,060	-0.06***	[0.00]
Advice: local utility	0.21	(0.41)	7,058	0.30	(0.46)	21,060	-0.09***	[0.01]
Belief about future price	3.81	(0.87)	6,352	3.86	(0.82)	19,773	-0.05***	[0.01]

4 Empirical strategy

Our empirical strategy follows two steps. First, we rely on an unconditional analysis in which we regress and plot various outcomes against distance to the language border without any further control. This allows us to detect for which variables gaps exist at the border. Second, we implement a series of regression discontinuity design estimations in which we include various types of control variables. We thereby investigate whether the impact of the border vanishes when further controls are included. All estimations are conducted using data at the household level.

4.1 Unconditional analysis

We begin our empirical analysis using the following linear specification:

$$y_{it} = \alpha_0 + \alpha_1 \cdot F_{it} + \beta_0 \cdot D_{it} + \beta_1 \cdot D_{it} \cdot F_{it} + \varepsilon_{it} \quad (1)$$

where y_{it} is the outcome of interest (electricity consumption or driving distance), F_{it} indicates that individual i is located in a French-speaking municipality in year t and D_{it} is the distance of the municipality from the language border. French-speaking (German-speaking) regions have positive (negative) distance to the language border, which ensures that the treatment effect at the border is given by coefficient α_1 . Estimations are conducted using household-level data from SHEDS 2016-2021 and without restrictions regarding distance from the border. As a sensitivity analysis, we augment equation (1) with quadratic and cubic terms in D_{it} , which let the relationship between distance to the border and the outcome of interest vary non-linearly and independently on both sides of the border.

We then estimate the following extended specification:

$$\ln(y_{imct}) = \alpha_0 + \alpha_1 \cdot F_m + \beta_0 \cdot D_m + \beta_1 \cdot F_m \cdot D_m + \tau_t + \delta_c + \gamma' X_{imct} + \varepsilon_{imct} \quad (2)$$

where the dependent variable y_{imct} is either the number of kilowatt-hours consumed or the number of kilometers traveled by car by household i living in municipality m of canton c during year t , and is taken in logarithmic form. F_m is a dummy variable that takes the value 1 if households i lives in a municipality m where the predominant language is French, and 0 otherwise (i.e., if the main language is German). τ_t represents time fixed effects and δ_c represents canton fixed effects. Year dummies (τ_t) are introduced to capture time-varying factors that potentially affect electricity consumption or car usage nationwide. Canton-specific dummies (δ_c) allow to account for time-invariant differences across cantons that may for instance result from institutions. X_{imct} is a vector of control variables measured at the household level, most of which vary over time. Finally, ε_{imct} is an error term.

The main coefficient of interest is α_1 , which represents the gap in the outcome variable y_{imct} at the border. Variable D_m is the (Euclidean) distance between the administrative center of municipality m and the closest point on the language border. As before, distance is coded positively for French-speaking municipalities (i.e., when $F_m = 1$) and negatively for German-speaking municipalities ($F_m = 0$). Since we include variable D_m as well as its interaction with the culture dummy F_m , our model allows to capture linear spatial trends in the outcome variable independently on both sides of the language border.

5 Empirical results

We begin our investigation of the role of culture by exploring how households electricity consumption and driving distance vary according to the distance to the language border. If culture matters for energy-related behaviors, we should observe different levels on both sides of the language border, and a gap at the border.

Equation (1) is used to estimate how electricity consumption and distance traveled vary with the distance to the language border. The results obtained with different polynomial orders in distance to the border are displayed in Table 4. Regardless of the specification, we find a significant and robust difference for driving distance.

In terms of electricity consumption, while the specification with a linear trend shows a significant difference between the French- and German-speaking regions, the result is not robust with higher polynomial orders.

Figures 2 to 4 provide a visual representation of the results in column (3) of Table 4, in which we also superimpose the average values for intervals 2 kilometers wide. In the estimations, French-speaking regions are assigned positive distances to the language border, while German-speaking regions are assigned negative distances. Yet, we reversed the x-axis in the Figures to have French-speaking (German-speaking) regions on the left (right) of the graphs for consistency with Switzerland' geogra-

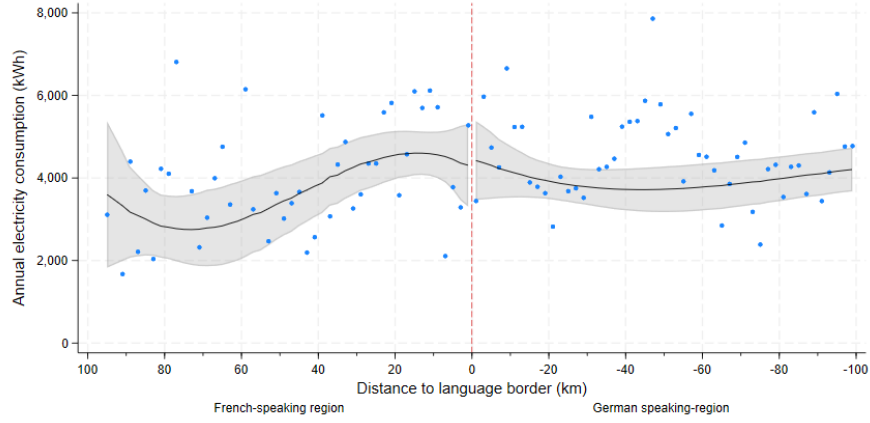
Table 4: The effect of culture on energy consumption

	(1)	(2)	(3)
Electricity consumption (kWh)			
Treatment effect	903.30** (414.74)	748.83 (635.19)	-251.24 (783.12)
Polynomial order	1	2	3
# Observations	11,719	11,719	11,719
R ²	0.007	0.007	0.010
Driving distance (self-reported estimation, km)			
Treatment effect	3404.20*** (500.81)	2292.60*** (772.97)	1983.54** (854.29)
Polynomial order	1	2	3
# Observations	16,928	16,928	16,928
R ²	0.012	0.014	0.014
Driving distance (retrieved from odometer readings, km)			
Treatment effect	3589.89*** (1084.87)	3294.58** (1591.97)	4358.48** (2037.82)
Polynomial order	1	2	3
# Observations	8,764	8,764	8,764
R ²	0.002	0.003	0.003

Note: robust standard errors clustered at municipality level in parentheses.
 ***/**/* indicates that the coefficient is significant at the 1/5/10% level.

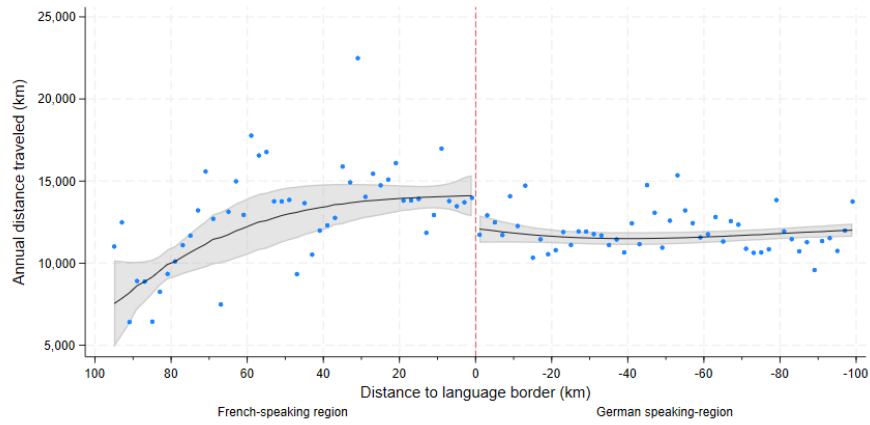
phy: French-speaking (German-speaking) regions are indeed in the west (east) of the country.

Figure 2: Electricity consumption, by distance to language border



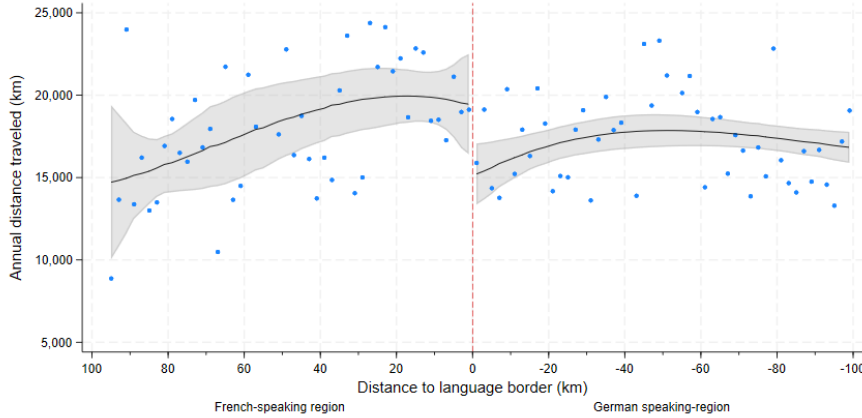
Notes: The plot is based on the results in column (3) of Table 4. The dots show average values within a two-kilometer bandwidth. Shaded area indicate the 95% confidence interval. Distances beyond 100 km and electricity consumption values above 8,000 kWh are excluded from the Figure.

Figure 3: Driving distance (self-reported estimation), by distance to language border



Notes: See notes on Figure 2. Driving distance values below 5,000 km or above 25,000 km are excluded from the Figure.

Figure 4: Driving distance (retrieved from odometer readings), by distance to language border



Notes: See notes on Figure 2. Driving distance values below 5,000 km or above 25,000 km are excluded from the Figure.

Figure 2, which plots annual electricity consumption, does not reveal any significant difference between the two cultural regions. Households appear to have relatively similar annual electricity consumption around 4,000 kWh across the entire country, with no noticeable discontinuity at the border. Spatial analysis of the average distance traveled by car by households (Figures 3 and 4), in contrast, reveal some differences. While car usage remains relatively stable within the German-speaking region, it appears to rise in the French-speaking region when approaching the border from the east. Interestingly, we observe a gap at the border, with French-speaking households driving more than their German-speaking counterparts.

We conducted the same analysis on further variables in our dataset that might be expected be related with electricity consumption and/or distance traveled (see Figures A.1 to A.10 in Appendix). Some variables display relatively large gaps at the language border. In particular, German-speaking households located close to the border appear to live farther away from their workplace compared to their French-speaking counterparts (see Figure A.3). Such a difference is somewhat unexpected, considering that commuting constitutes a substantial share of private trips but annual distance traveled is lower for German-speaking households. Yet,

this is consistent with results from the Mobility and Transport Microcensus (SFSO, 2023), which show that German-speaking regions systematically stand out with much higher modal shares of public transport than French-speaking regions even after controlling for the quality of public transportation. On the other hand, and contrarily to what Filippini and Wekhof (2021) obtain, we do not find any difference at the border regarding the share of efficient vehicles (see Figure A.2).⁹ The most striking difference is observed for hedonistic values (see Figure A.10), which are substantially higher for French-speaking households than for German-speaking ones. This difference suggests that cultural differences do exist between the two regions.

Results obtained with the regression discontinuity design described in equation (2) are presented in Table 5 for electricity usage and Tables 6 and 7 for distance traveled. For electricity usage, none of the RDD estimations reveal a gap at the language border. For distance traveled, there is however a significant gap (unless a narrow bandwidth of only 25 km around the border is considered). When considering observations up to 50 km from the border or more, the estimated gap at the border amounts to 0.25 log points, that is a difference of 28% in annual distance traveled. Such a difference appears substantial and subsists even though a number of structural factors that could explain differences in distance traveled have been accounted for. In particular, one may expect distance from home to work to be different across the two regions, but this variable – while have a significant and positive effect on annual distance – does not annihilate the gap at the border.

⁹This is based on the respondents' self-reported energy labels as opposed to Filippini and Wekhof (2021) who use administrative data.

Table 5: RDD for electricity consumption

	(1) All	(2) <100 km	(3) <50 km	(4) <25 km
French-speaking	-0.019 (0.065)	-0.001 (0.065)	-0.006 (0.071)	-0.023 (0.086)
Year=2017	-0.026* (0.016)	-0.023 (0.017)	-0.009 (0.023)	-0.005 (0.031)
Year=2018	-0.033** (0.017)	-0.027 (0.017)	-0.014 (0.024)	-0.015 (0.031)
Year=2019	-0.059*** (0.016)	-0.060*** (0.017)	-0.029 (0.024)	-0.016 (0.030)
Year=2020	-0.064*** (0.017)	-0.064*** (0.018)	-0.035 (0.025)	-0.031 (0.031)
Year=2021	-0.032* (0.019)	-0.026 (0.019)	0.016 (0.027)	0.036 (0.036)
Distance(-/+)	-0.002** (0.001)	-0.001 (0.001)	-0.001 (0.002)	-0.003 (0.003)
Distance(-/+) × French-speaking	0.001 (0.002)	0.000 (0.002)	0.000 (0.003)	0.004 (0.005)
Number of HH members	0.045*** (0.014)	0.042*** (0.016)	0.011 (0.024)	-0.015 (0.026)
Man in single person HH	-0.097* (0.052)	-0.093* (0.057)	-0.168* (0.086)	-0.133 (0.103)
Woman in single person HH	-0.174*** (0.055)	-0.176*** (0.058)	-0.274*** (0.089)	-0.411*** (0.152)
m ² /HH member	0.001** (0.000)	0.001* (0.000)	0.001 (0.001)	0.000 (0.001)
Tenant or living in coop.	-0.170*** (0.064)	-0.194*** (0.070)	-0.097 (0.094)	-0.079 (0.127)
Living in a house	0.201*** (0.039)	0.209*** (0.043)	0.211*** (0.059)	0.199*** (0.070)
Space heating: electricity	0.114* (0.061)	0.113* (0.065)	0.042 (0.082)	0.058 (0.108)
Water heating: electricity	0.065** (0.029)	0.084*** (0.032)	0.111*** (0.041)	0.161*** (0.055)
Space heating: heat pump	0.090** (0.035)	0.081** (0.038)	0.136*** (0.052)	0.125* (0.072)
Income CHF 3,000-4,499	0.017 (0.048)	0.024 (0.051)	0.035 (0.078)	0.067 (0.117)
Income CHF 4,500-5,999	-0.008 (0.053)	0.003 (0.053)	0.043 (0.079)	0.070 (0.114)
Income CHF 6,000-8,999	-0.025 (0.057)	-0.016 (0.057)	0.060 (0.083)	0.075 (0.124)
Income CHF 9,000-12,000	-0.026 (0.061)	-0.015 (0.062)	0.055 (0.090)	0.090 (0.132)
Income > CHF 12,000	-0.044 (0.066)	-0.030 (0.066)	0.053 (0.095)	0.072 (0.141)
University degree	-0.042 (0.045)	-0.027 (0.045)	-0.105 (0.074)	-0.159* (0.090)
Bill info source	-0.017 (0.022)	-0.012 (0.024)	-0.000 (0.032)	-0.045 (0.037)
ln(Price of 1 kWh)	0.002 (0.022)	0.003 (0.024)	-0.004 (0.041)	-0.011 (0.052)
Time-of-use tariff	0.033 (0.029)	0.034 (0.033)	0.011 (0.040)	0.074 (0.048)
Canton Fixed Effects	Yes	Yes	Yes	Yes
HH-specific Means (CRE)	Yes	Yes	Yes	Yes
# Observations	9,523	8,315	4,399	2,759
R ²	0.5048	0.5129	0.5246	0.5293

Table 6: RDD for distance traveled (self-stated estimation)

	(1) All	(2) <100 km	(3) <50 km	(4) <25 km
French-speaking	0.269*** (0.058)	0.263*** (0.059)	0.248*** (0.067)	0.081 (0.078)
Year=2018	-0.018 (0.013)	-0.009 (0.014)	-0.009 (0.019)	0.020 (0.024)
Year=2019	-0.055*** (0.014)	-0.042*** (0.015)	-0.046** (0.020)	-0.028 (0.027)
Year=2020	-0.097*** (0.014)	-0.085*** (0.015)	-0.080*** (0.022)	-0.048* (0.028)
Year=2021	-0.149*** (0.015)	-0.144*** (0.016)	-0.127*** (0.022)	-0.097*** (0.029)
Distance(-/+)	0.000 (0.001)	-0.000 (0.001)	-0.002 (0.002)	-0.007** (0.003)
Distance(-/+) × French-speaking	-0.000 (0.002)	0.000 (0.002)	0.004 (0.003)	-0.000 (0.005)
Number of HH members	0.000 (0.009)	-0.000 (0.009)	-0.004 (0.009)	-0.003 (0.013)
Man in single person HH	0.005 (0.039)	-0.002 (0.041)	-0.013 (0.053)	0.005 (0.073)
Woman in single person HH	0.063 (0.041)	0.051 (0.044)	0.000 (0.060)	-0.026 (0.078)
Tenant or living in coop.	-0.024 (0.040)	-0.016 (0.042)	0.034 (0.064)	0.123 (0.085)
Living in a house	0.002 (0.030)	0.015 (0.033)	-0.001 (0.049)	0.015 (0.060)
Home to work travel distance	0.001*** (0.000)	0.002*** (0.000)	0.002*** (0.001)	0.002* (0.001)
Income CHF 3,000-4,499	0.078 (0.060)	0.126** (0.062)	0.031 (0.068)	0.051 (0.117)
Income CHF 4,500-5,999	0.098 (0.065)	0.120* (0.067)	0.028 (0.070)	0.020 (0.118)
Income CHF 6,000-8,999	0.089 (0.065)	0.104 (0.067)	0.009 (0.069)	-0.021 (0.122)
Income CHF 9,000-12,000	0.102 (0.067)	0.122* (0.070)	0.017 (0.074)	0.035 (0.130)
Income > CHF 12,000	0.124* (0.071)	0.163** (0.074)	0.076 (0.081)	0.082 (0.136)
University degree	-0.109* (0.058)	-0.099 (0.061)	-0.078 (0.086)	-0.151 (0.098)
Canton Fixed Effects	Yes	Yes	Yes	Yes
HH-specific Means (CRE)	Yes	Yes	Yes	Yes
# Observations	13,265	11,517	6,442	3,675
R ²	0.1078	0.1081	0.1025	0.1201

Table 7: RDD for distance traveled (retrieved from odometer readings)

	(1) All	(2) <100 km	(3) <50 km	(4) <25 km
French-speaking	0.004 (0.097)	0.014 (0.098)	0.089 (0.107)	-0.073 (0.127)
Year=2018	-0.036 (0.031)	-0.024 (0.033)	-0.039 (0.048)	-0.011 (0.059)
Year=2019	-0.017 (0.031)	0.000 (0.033)	0.001 (0.046)	-0.006 (0.056)
Year=2020	-0.121*** (0.033)	-0.089*** (0.034)	-0.044 (0.049)	-0.020 (0.060)
Year=2021	-0.224*** (0.032)	-0.201*** (0.035)	-0.229*** (0.048)	-0.264*** (0.061)
Distance(-/+)	0.002 (0.002)	0.002 (0.002)	0.004 (0.003)	-0.001 (0.006)
Distance(-/+) \times French-speaking	-0.003 (0.002)	-0.003 (0.003)	-0.001 (0.004)	-0.009 (0.008)
Number of HH members	-0.003 (0.029)	-0.005 (0.031)	0.032 (0.032)	0.017 (0.052)
Man in single person HH	0.014 (0.086)	0.070 (0.092)	0.095 (0.108)	0.105 (0.129)
Woman in single person HH	-0.029 (0.101)	-0.038 (0.107)	-0.094 (0.156)	-0.371** (0.185)
Tenant or living in coop.	0.042 (0.083)	0.037 (0.092)	0.044 (0.130)	0.216 (0.178)
Living in a house	-0.044 (0.064)	0.000 (0.069)	0.028 (0.097)	0.103 (0.124)
Home to work travel distance	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.002)
Income CHF 3,000-4,499	-0.238* (0.139)	-0.259* (0.152)	-0.040 (0.171)	0.177 (0.161)
Income CHF 4,500-5,999	-0.178 (0.126)	-0.208 (0.138)	-0.103 (0.167)	0.046 (0.169)
Income CHF 6,000-8,999	-0.180 (0.127)	-0.151 (0.135)	0.019 (0.160)	0.019 (0.169)
Income CHF 9,000-12,000	-0.130 (0.131)	-0.076 (0.139)	0.110 (0.168)	0.125 (0.197)
Income > CHF 12,000	-0.119 (0.142)	-0.043 (0.151)	0.247 (0.195)	0.294 (0.273)
University degree	-0.036 (0.111)	-0.044 (0.130)	0.164 (0.166)	0.129 (0.147)
Canton Fixed Effects	Yes	Yes	Yes	Yes
HH-specific Means (CRE)	Yes	Yes	Yes	Yes
# Observations	6,715	5,762	3,120	1,810
R ²	0.0805	0.0812	0.0867	0.1113

6 Conclusion

In this paper we investigated the existence of different energy cultures within a European country containing different linguistic regions separated by a sharp border. Using household data from Switzerland, we provide an analysis of differences in a series of psychological and cultural factors between French and German-speaking regions. The results point to statistically significant differences in many psychological determinants. We use a Regression Discontinuity Design to investigate if these cultural differences translate to differences in energy consumption, hence different energy cultures. More specifically, we analyze whether differences can be observed across the French-German language border regarding electricity usage and annual distance traveled. Our results indicate that electricity usage is not different between the two regions. However, there are statistically significant differences regarding private transportation: Households from the French-speaking region drive on average, longer distances than those living in the German-speaking region.

Our findings indicate significant differences in several cultural attributes between the two groups. Notably, compared to similar German-speaking households, the French-speaking group exhibits higher levels of environmental values. They also show greater trust in government authorities and have higher hedonistic motivations. All these differences can be relevant to energy outcomes. One may expect for instance that pro-social and pro-environmental values might result in lower energy demand. However, the observed behavioral differences suggest an opposite pattern in driving distances and no significant difference in electricity consumption across the two groups. It is also remarkable that the French-speaking group, while driving more, owns slightly more efficient vehicles. This suggests that the differences in car-related choices are potentially related to hedonistic values, with the French-speaking group opting for better cars and using them more often. Overall, the results provide evidence of distinct mobility cultures across the language border. Both groups are interesting targets for energy transition policies with the French-speaking group as a relevant target for reducing usage of own car, and the German-speaking group as a relevant segment for energy efficiency. Greater usage

of private vehicles in the French-speaking region could be linked to higher materialistic values. This suggests that policies promoting usage of substitution travel models such as public transport should pay special attention to material aspects such as comfort and quality. On the other hand the German-speaking group is relatively more individualistic and shows less trust in public authorities. Promotion campaigns should therefore emphasize necessity and independence benefits of fuel-efficient vehicles.

References

- Allcott, H. and Greenstone, M. (2012). Is there an energy efficiency gap? *Journal of Economic Perspectives*, 26(1):3–28.
- Deopa, N. and Fortunato, P. (2020). Coronagraben: Culture and social distancing in times of COVID-19. *Covid Economics*, 39:186–216.
- Eugster, B., Lalive, R., Steinhauer, A., and Zweimüller, J. (2017). Culture, work attitudes, and job search: Evidence from the Swiss language border. *Journal of the European Economic Association*, 15(5):1056–1100.
- Eugster, B. and Parchet, R. (2019). Culture and taxes. *Journal of Political Economy*, 127(1):296–337.
- Farsi, M. (2010). Risk aversion and willingness to pay for energy efficient systems in rental apartments. *Energy Policy*, 38(6):3078–3088. The Role of Trust in Managing Uncertainties in the Transition to a Sustainable Energy Economy, Special Section with Regular Papers.
- Farsi, M. and Weber, S. (2024). Swiss Household Energy Demand Survey: Past experiences and new perspectives. IRENE Working Papers 24-06, Institute of Economic Research, University of Neuchâtel.
- Filippini, M. and Wekhof, T. (2021). The effect of culture on energy efficient vehicle ownership. *Journal of Environmental Economics and Management*, 105:102400.

- Hahnel, U. J. and Brosch, T. (2018). Environmental trait affect. *Journal of Environmental Psychology*, 59:94–106.
- Hediger, C., Farsi, M., and Weber, S. (2018). Turn it up and open the window: On the rebound effects in residential heating. *Ecological Economics*, 149:21–39.
- Hille, S., Weber, S., and Brosch, T. (2019). Consumers’ preferences for electricity-saving programs: Evidence from a choice-based conjoint study. *Journal of Cleaner Production*, 220:800–815.
- Ho, E. (2015). Bound by ethical complexities and socio-material histories: An exploration of household energy consumption in Singapore. *Energy Research & Social Science*, 10:150–164.
- Hofstede, G. (1984). *Culture’s consequences: International differences in work-related values*, volume 5. Sage.
- Hofstede, G. (1998). Attitudes, values and organizational culture: Disentangling the concepts. *Organization Studies*, 19(3):477–493.
- Koseki, S. A. (2018). The geographic evolution of political cleavages in Switzerland: A network approach to assessing levels and dynamics of polarization between local populations. *Plos one*, 13(11):e0208227.
- Lyubich, E. (2020). The race gap in residential energy expenditures. Working Paper 306, Energy Institute at HAAS.
- Mavisakalyan, A. and Weber, C. (2018). Linguistic structures and economic outcomes. *Journal of Economic Surveys*, 32(3):916–939.
- Mazzonna, F. (2020). Cultural differences in COVID-19 spread and policy compliance: Evidence from Switzerland. *Covid Economics*, 33:163–185.
- Miller, D. (2001). *Car cultures*. Oxford: Berg Publishers.
- Newell, R. G. and Siikamäki, J. (2015). Individual time preferences and energy efficiency. *American Economic Review*, 105(5):196–200.

- SFOE (2021). Statistique globale suisse de l'énergie. SFOE publication, Swiss Federal Office of Energy, Bern.
- SFSO (2022). Le paysage linguistique en suisse. SFSO publication, Swiss Federal Statistical Office, Neuchâtel.
- SFSO (2023). Comportement de la population en matière de mobilité. SFSO publication, Swiss Federal Statistical Office, Neuchâtel.
- Shove, E., Trentmann, F., and Wilk, R. (2009). *Time, consumption and everyday life: practice, materiality and culture*. Routledge.
- Shove, E., Watson, M., and Spurling, N. (2015). Conceptualizing connections: Energy demand, infrastructures and social practices. *European Journal of Social Theory*, 18(3):274–287.
- Sorrell, S. and Dimitropoulos, J. (2008). The rebound effect: Microeconomic definitions, limitations and extensions. *Ecological Economics*, 65(3):636–649.
- Steg, L., Perlaviciute, G., van der Werff, E., and Lurvink, J. (2014). The significance of hedonic values for environmentally relevant attitudes, preferences, and actions. *Environment and Behavior*, 46(2):163–192.
- Stephenson, J. (2018). Sustainability cultures and energy research: An actor-centred interpretation of cultural theory. *Energy Research & Social Science*, 44:242–249.
- Stephenson, J., Barton, B., Carrington, G., Doering, A., Ford, R., Hopkins, D., Lawson, R., McCarthy, A., Rees, D., Scott, M., Thorsnes, P., Walton, S., Williams, J., and Wooliscroft, B. (2015). The energy cultures framework: Exploring the role of norms, practices and material culture in shaping energy behaviour in New Zealand. *Energy Research & Social Science*, 7:117–123.
- Stephenson, J., Barton, B., Carrington, G., Gnoth, D., Lawson, R., and Thorsnes, P. (2010). Energy cultures: A framework for understanding energy behaviours. *Energy Policy*, 38(10):6120–6129.

- SWI (2020). How the covid-19 crisis reveals cultural divide between swiss language regions. Newspaper article, SWI swissinfo.ch.
- Tata, J. and Prasad, S. (2015). National cultural values, sustainability beliefs, and organizational initiatives. *Cross Cultural Management: An International Journal*, 22(2):278–296.
- Weber, S., Burger, P., Farsi, M., Martinez-Cruz, A. L., Puntiroli, M., Schubert, I., and Volland, B. (2017). Swiss household energy demand survey (SHEDS): Objectives, design, and implementation. IRENE Working Papers 17-14, Institute of Economic Research, University of Neuchâtel.
- Weber, S. and Farsi, M. (2014). Travel distance, fuel efficiency, and vehicle weight: An estimation of the rebound effect using individual data in Switzerland. IRENE Working Papers 14-03, Institute of Economic Research, University of Neuchâtel.
- Weber, S. and Péclat, M. (2017). A simple command to calculate travel distance and travel time. *Stata Journal*, 17(4):962–971.
- Weber, S., Péclat, M., and Warren, A. (2022). Travel distance and travel time using stata: New features and major improvements in georoute. *The Stata Journal*, 22(1):89–102.
- Wilhite, H., Shove, E., Lutzenhiser, L., and Kempton, W. (2000). The legacy of twenty years of energy demand management: we know more about individual behaviour but next to nothing about demand. In Jochem, E., Sathaye, J., and Bouille, D., editors, *Society, Behaviour, and Climate Change Mitigation*, pages 109–126. Springer Netherlands, Dordrecht.
- Wynes, S. and Nicholas, K. A. (2017). The climate mitigation gap: Education and government recommendations miss the most effective individual actions. *Environmental Research Letters*, 12(7):074024.

A Appendix

Figure A.1: Household size, by distance to language border

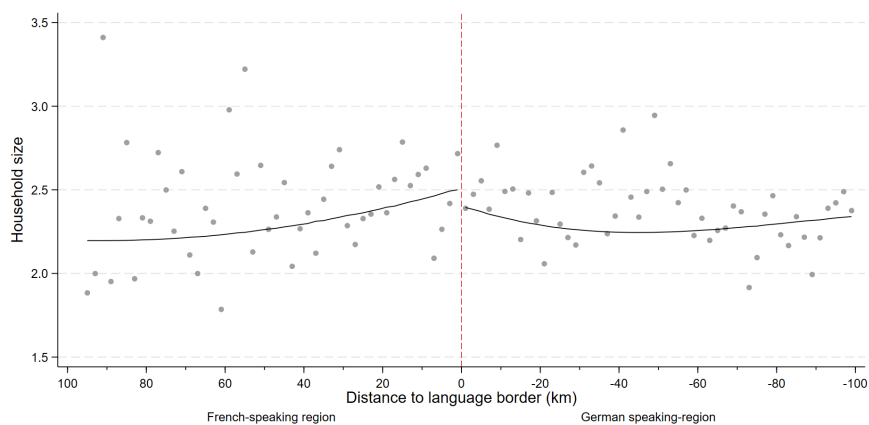


Figure A.2: Share of efficient cars, by distance to language border

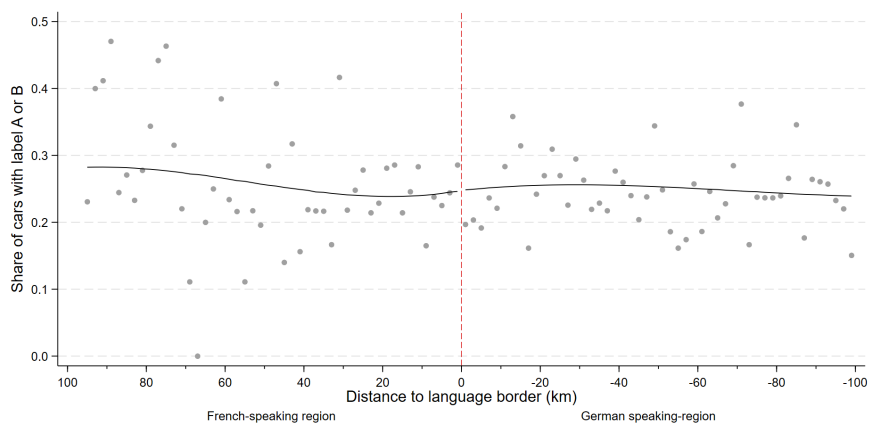


Figure A.3: Distance from home to work, by distance to language border

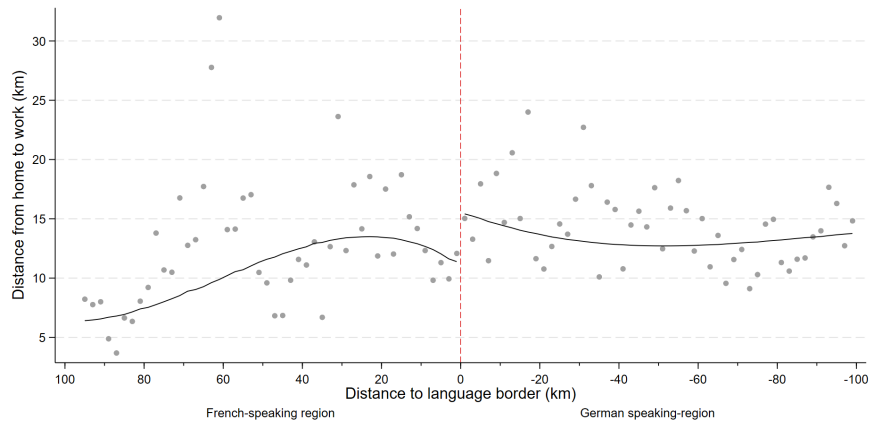


Figure A.4: Trust in SFOE, by distance to language border

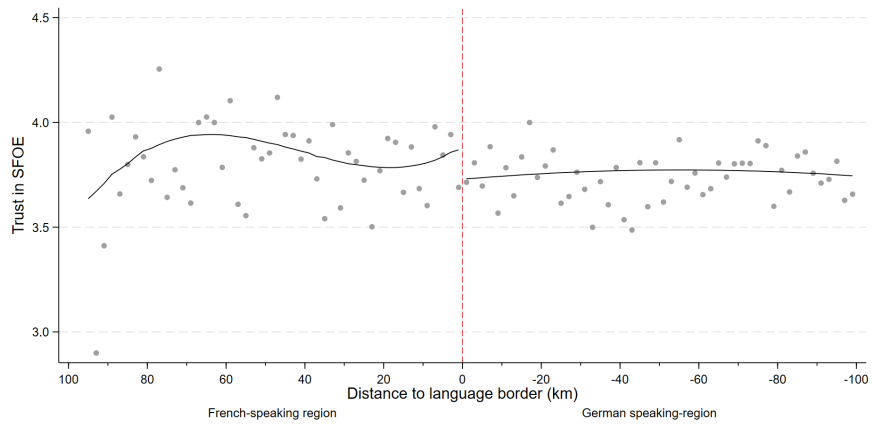


Figure A.5: Trust in local authorities, by distance to language border

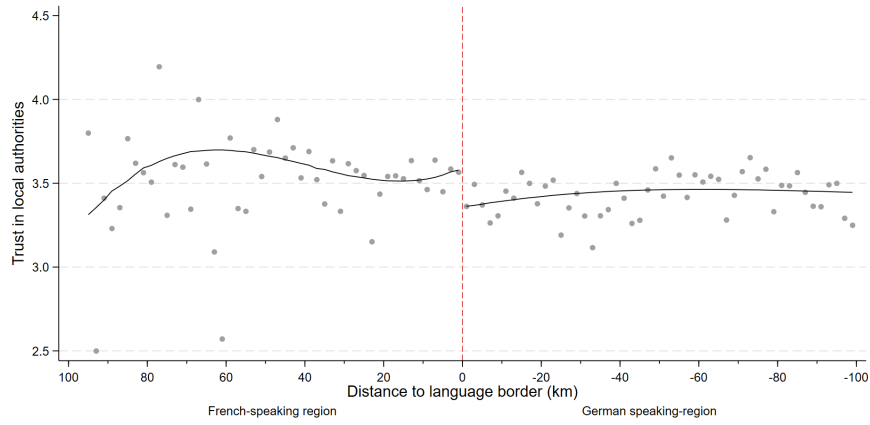


Figure A.6: Trust in local energy supplier, by distance to language border

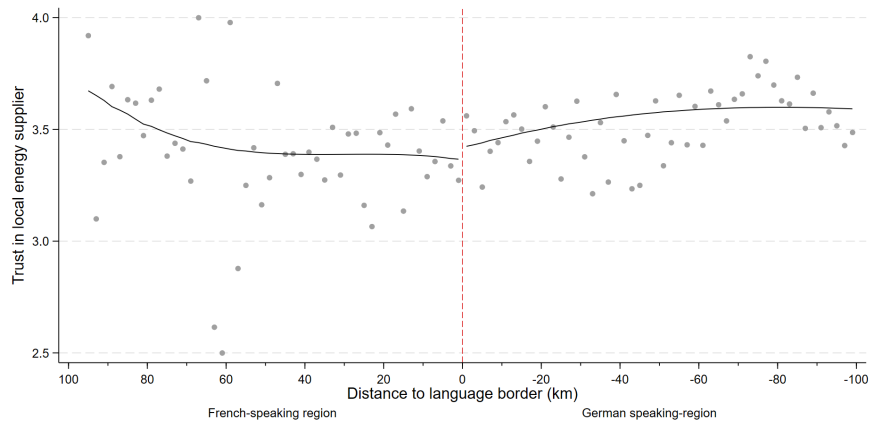


Figure A.7: Altruistic values, by distance to language border

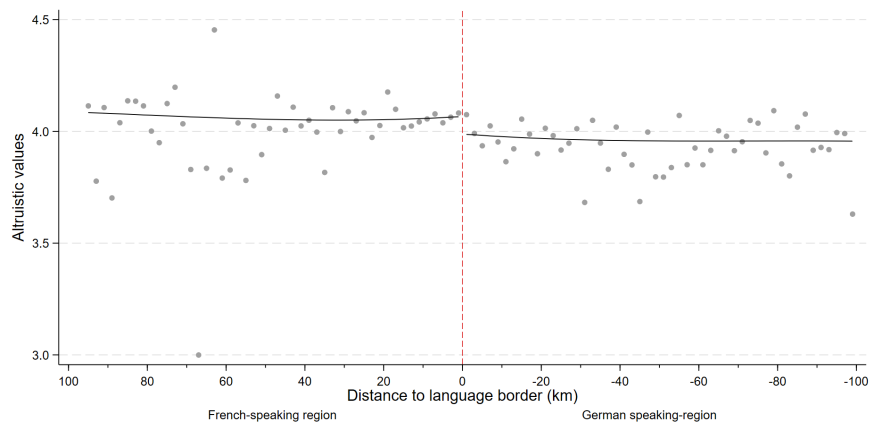


Figure A.8: Biospheric values, by distance to language border

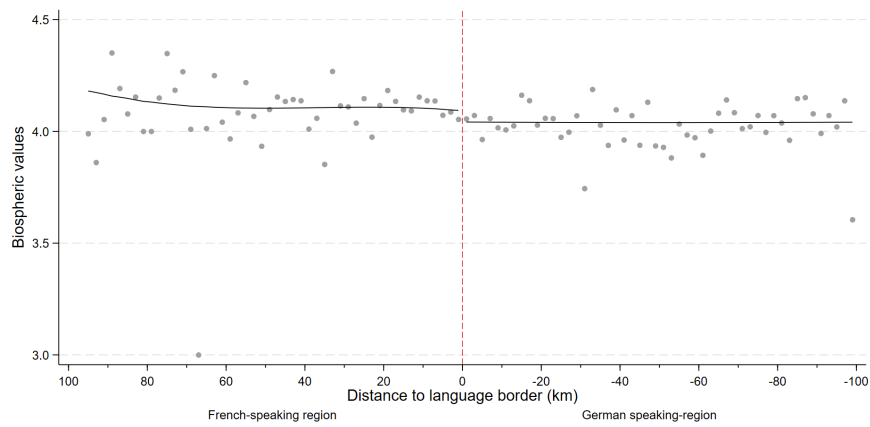


Figure A.9: Egoistic values, by distance to language border

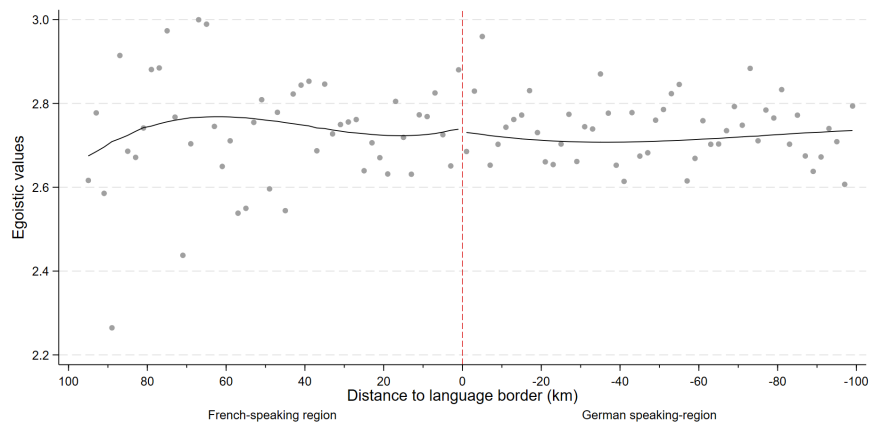


Figure A.10: Hedonistic values, by distance to language border

