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Abstract

The aim of this paper is to assess the role of culture in shaping individual preferences towards different long-term care (LTC) arrangements. The analysis uses Swiss data from two administrative databases covering the universe of formal LTC providers between 2007 and 2013. Switzerland is a multi-cultural confederation where state administrative borders do not always coincide with cultural groups. For this reason, we exploit the within-state variation in cultural groups to show evidence about cultural differences in LTC use. In particular, we use spatial regression discontinuity design (RDD) at the language border between French-speaking and German-speaking individuals living in bilingual cantons to provide causal interpretation of the differences in formal LTC use between these two main cultural groups. Our results suggest a strong role of culture in shaping household decisions about formal LTC use. In particular, elderly people residing in regions speaking a Latin language (French, Italian and Romansh) use home-based care services more intensely and enter in nursing homes at older ages and in worse health conditions with respect to elderly people in German regions. This difference across the two cultural groups are driven by different preferences towards LTC arrangements.

Keywords: Long-term care, Culture, Spatial RDD.

JEL codes: I11, I18, C26.

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1 Introduction

Because of population aging, long-term care (LTC) expenditure is expected to increase substantially in the next 50 years (OECD, 2013), raising the burden on society to cover elderly care services (Karlsson et al., 2006). In Europe, the percentage of people over 64 rose rapidly in the past decades and is expected to increase between two and six times by 2060. Given the importance of such trends, understanding the determinants of LTC demand is of fundamental importance to correctly target policy measures. The aim of this paper is to explore the extent to which cultural factors may influence LTC arrangement decisions.

According to the place where elderly care is provided, LTC arrangements can be distinguished between residential care provided in nursing homes and home-based care provided at the individual's home. While residential care is always formally provided, home-based care can be either formal or informal - that is, provided by family members. In this paper, we focus on choices among formal care services, i.e. between residential care and formal home-based care.

Generally speaking, LTC arrangements respond to different needs and the choice among them is the result of different factors. The health condition of the older person is of fundamental importance in deciding the amount of formal and informal care required (Bonsang, 2009; Norton, 2000; Kemper, 1992). In many cases, elderly people choose residential care only when their health condition is too critical to be cared at home (Ryan and Scullion, 2000). Moreover, gender, income and age are all important determinants of LTC use and choice, even though they are proxies for the health status of the individual (Norton, 2000). Another important determinant is the availability of substitutes for care. Indeed, cohabiting with other people increases the probability of receiving informal care, while living alone is significantly associated to higher formal home-based care and nursing home use (Kemper, 1992). Finally, payment schemes for formal health care services are also found to influence LTC use (Orsini, 2010; Grabowski, 2006; Reschovsky, 1998; Pezzin et al., 1996).

In recent years, the literature has grown significantly on the economic impact of cultural factors (e.g., Alesina and Giuliano, 2015; Guiso et al., 2006). According to Guiso et al. (2006, p. 2), culture can be defined as *‘those customary beliefs, values, and social constraints that ethnic, religious, and social groups transmit fairly unchanged from generation to generation’*. Particularly, culture has a meaningful role in explaining economic outcomes when it influences expectations, preferences or constraints. Giuliano (2007) investigates how different cultures affect living arrangements, showing that children of Southern European immigrants in the United States tend to cohabit with their parents up to older ages as compared to children of Northern European immigrants. Since both Southern European and Northern European immigrants' children face the same institutional envi-

ronment, differences in children living arrangements should be the result of different cultural-driven preferences.¹ Social scientists have also widely explored the cultural-driven north-south gradient in LTC arrangements across European countries (Reher, 1998; Daatland and Herlofson, 2003; Bolin et al., 2008; Oudijk et al., 2011; Simonazzi, 2009), showing that in Continental and Scandinavian countries the elderly are more likely to be institutionalized (i.e. in nursing homes) and to use formal health care services than in Mediterranean countries. Notably, Costa-Font (2010) finds that family ties influence the decisions to purchase LTC insurance, and that European countries with stronger family ties exhibit lower levels of formal LTC coverage. Nevertheless, in these studies the presence of significant differences among Southern, Central and Northern European countries in LTC utilization might be driven by the large differences in institutional settings.

The empirical strategy adopted in this paper overcomes the drawbacks posed by different institutional settings in cross-country comparisons. The focus of our research is on Switzerland, a multi-cultural confederation of 26 states, called cantons, and four distinct cultural groups. These cultural groups are geographically well-delimited on their territory, and correspond to two main different linguistic groups, namely German and Latin (French, Italian and Romansh). Interestingly, differences among Swiss linguistic groups are also confirmed by genetic markers (Novembre et al., 2008).² While cantons have large power in setting local economic policies, cultural groups within Switzerland do not necessarily follow cantonal borders (see Figure 1). Particularly, the linguistic divide between French-speaking communities to the West of the country and German-speaking communities to the Central and North-Eastern part of the country is very sharp, and cuts three cantons (Berne, Fribourg and Valais) without any natural barrier separating the two linguistic areas (see Figure 2). This makes Switzerland a unique institutional setting to explore the impact of culture diversity on economic outcomes.

Such a peculiar environment, especially the three bilingual cantons that are crossed by the German/French linguistic border, has been widely exploited in the literature to infer the role of culture on various economic outcomes (Eugster et al., 2011; Eugster and Parchet, 2013; Steinhauer, 2013). In particular, regions speaking a Latin language support more redistribution and family policies than German speaking regions. For this reason, in the following we adopt the main language spoken as a direct proxy for culture.

To analyze the role of cultural differences in LTC arrangements, our analysis relies on two

¹Other articles using immigrants behaviour in the United States to identify the role of culture on economic outcomes are Antecol (2000), Carroll et al. (1994) and Fogli and Fernandez (2009).

²Novembre et al. (2008) show that people in each linguistic area are genetically closer to people from bordering countries speaking the same language rather than to other Swiss people coming from different linguistic areas. Also, language has been shown to profoundly influence culture and social identity per se (Clots-Figueras and Masella, 2013).

administrative datasets covering the universe of nursing home and home-based care providers for the period 2007-2013. Our main dependent variable is the dependency level at entry in nursing homes, i.e. the initial intensity of care required by the elderly person. Figure 3 shows the distribution of dependency levels at entry in nursing homes across linguistic areas. In Latin-speaking regions people enter a nursing home in worse health condition (and older ages) than in German-speaking regions. In the paper, we also show opposite evidence regarding the use of formal home care services, which is much stronger in regions speaking a Latin language (especially French). This result rests on the idea that people in regions speaking a Latin language postpone entrance in nursing homes, at least until the health condition of the elderly person becomes too problematic to be cared for at home.

To further investigate this cultural gradient, the empirical analysis is structured in two parts. First, we exploit the within-canton variation in the language spoken to show first evidence about cultural differences in LTC use, both for home-based care and nursing home care. Second, as in Eugster et al. (2011), we use a spatial regression discontinuity design (RDD) at the linguistic border of French- and German-speaking bilingual cantons (Berne, Fribourg and Valais) to provide causal interpretation of differences in entry decisions in nursing homes. To this end, we exploit individual data and look at differences in the dependency levels at entry in nursing homes.

The main results of this paper show that culture has a prominent role in LTC decisions. In particular we show that there are large differences in LTC arrangements across linguistic areas, even taking into account institutional differences. In addition, using voting data,³ we show that these differences are clearly driven by different population preferences. The RDD analysis confirms that individuals residing in the French-speaking part of bilingual cantons systematically show higher dependency levels at entry in nursing homes than individuals residing in the German-speaking part. Precisely, this French-German gap accounts for at least 16% of the standard deviation in the dependency level. This result is robust to different bandwidths and polynomial specifications.

The contribution of this paper to the literature is threefold. First, the paper investigates the magnitude and the importance of culture on LTC arrangements and, therefore, it adds to the literature of the determinants of LTC use. Second, the paper identifies the impact of culture on LTC arrangement decisions, adding to the literature about the role of culture in shaping economic outcomes. Finally, the paper sheds some light on the driving forces behind the substitutability between different LTC arrangements. The substitutability among LTC services is fundamental in determining the potential for cost containment in the provision of elderly care (Bolin et al., 2008;

³The 2012 referendum on the introduction of a constitutional article promoting work-life balance. See Section 4 for further details.

Stabile et al., 2006; Charles and Sevak, 2005; Van Houtven and Norton, 2004; Ettner, 1994). If different LTC arrangements are substitutes, cost reductions can be achieved simply by shifting LTC provision toward the most cost-effective LTC combination. As a matter of fact, nursing homes are more cost-effective than home-based care for relatively high levels of care required (Kok et al., 2015). To the same extent, different LTC arrangements may have different implications in terms of welfare for either the care provider or the care receiver. For example, Pezzin et al. (1996) find that an increase in formal home-based care does not reduce the use of informal care but increases the overall amount of care received by the elderly. Our results suggest that culture plays a decisive role in determining the extent of this substitution.

Our findings may have strong policy implications. Public policies incentivizing specific LTC arrangements may lead to different behavioral responses according to the predominant preferences in the population, either in a cost minimization or in a welfare maximization perspective. For example, in Switzerland between 27% and 56% of days spent in nursing homes in 2013 involved people with very low need of care. Notably, experts argue that people receiving between one and two hours of daily care could be cared more efficiently with formal home-based services than in nursing homes (Wächter and Künzi, 2011). However, given the stronger preferences for nursing homes in the German-speaking area, public interventions aiming at incentivizing the use of home-based services should be directed more intensely toward the German-speaking area. Nonetheless, if the final goal is welfare maximization, the policy maker should consider that people in the German-speaking area may be better-off entering in nursing homes earlier than French-speaking people. Consequently, recognizing the role of culture in shaping individual preferences is crucial to correctly target public interventions in the LTC market.

The remaining of the paper is structured as follows. The next section explains the institutional background and provides some basic insights about the organization of formal LTC in Switzerland. Then, Section 3 provides a simple conceptual framework to understand the role of culture in shaping LTC arrangement decisions, while Section 4 presents the data and the preliminary descriptive statistics. As aforementioned, the empirical analysis is structured in two parts and is presented in Section 5. Finally, Section 6 concludes.

2 Institutional and cultural background

2.1 Language, culture and administrative borders

In Switzerland there are 26 cantons and 4 official languages: German, French, Italian and Romansh. In 2013, the Swiss population counted about 8 million people. German was spoken by 63.5% of

the population, French by 22.5%, Italian by 8.1% and Romansh only by 0.5%. Linguistic areas are well-delimited on the territory: the German-speaking part is located in the Centre-East of the country, French is spoken in the West, Italian in the South and Romansh in some valleys of the South-East. However, linguistic areas do not always coincide with cantonal administrative borders. Specifically, three cantons — Berne, Fribourg and Valais — overlap with both French-speaking and German-speaking areas, while the canton of Graubünden overlaps with German-, Italian- and Romansh-speaking areas (see Figure 1). As shown by Figure 2, the discontinuity in languages is geographically well-delimited in the Graubünden canton, where Romansh and Italian are spoken in some specific valleys. However, the language discontinuity between French-speaking areas in the Western part of the country and German-speaking areas in the Central part runs from North to South without geographical barriers separating the two linguistic areas. In addition, the mountain barrier of the Alps is located in the South of Switzerland, and runs from East to West, while the Northern part of Switzerland is mainly covered by hills. Thus, there are no morphological differences between the two sides of the linguistic border.

Our analysis involves 4 administrative levels: the confederation, cantons, districts and municipalities. Cantons are the states of the Swiss confederation with large autonomy in terms of health-care organization and policy, while districts are aggregations of municipalities within a canton. Districts do not have any legislative or executive power nor any democratically elected authority, but still play a role in the organization of some services such as home-based care. The Confederation sets general guidelines, including the services that health insurers must provide, the procedures for the assessment of the intensity of care required by patients, and the maximum contribution of insurers and patients to cover LTC expenditure. Cantons are in charge of the organization of LTC services. In particular, they accredit providers, set quality standards, and monitor the functioning of the LTC market. Finally, municipalities are entitled to organize and guarantee the provision of LTC on their territory. To this end, they can coordinate with other municipalities or with the canton.

2.2 LTC organization

Population aging is a common phenomenon in all developed countries and Switzerland makes no exception. In 2012, the expenditure for nursing home care was 13.3% of the overall health care expenditure, and its incidence on GDP is expected to increase from 1.3% to 3.8% in 2060. The supply of LTC follows the increasing trend of demand. In 2006, there were 82,000 people employed

in the LTC sector, while this number rose to 105,000 in 2013 (CreditSuisse, 2015).⁴

The Swiss health care system is based on private health care insurance, which is compulsory for all citizens. Cantons guarantee health insurance subscription to those who cannot afford it⁵. LTC delivery system is highly decentralized and cantons started a federal coordination only recently. The Confederation sets the maximum contribution of patients and health insurers to both residential care and home-based care. Within the guidelines imposed by the Confederation, each canton may establish different contributions for patients and health insurers. In particular, German speaking regions have so far relied more heavily on nursing homes, whereas French and Italian speaking areas have developed more home care services. According to the last change in the federal Law,⁶ about 65% of the cost of health care provided by either nursing homes or home-based health care services is covered by compulsory health insurance, and their reimbursement is regulated by the federal law on the compulsory health insurance (LAMAL).⁷ Patients or residents themselves can be made to cover up to 20% of such costs (a ceiling of approximately 8,000 CHF per year). The remainder is covered by public authorities (cantons and municipalities). However, the canton establishes whether the residual costs for LTC are covered by the canton itself or by the patient's municipality of residence. Conversely, residential costs and help at home for activities of daily living (ADL) and instrumental activities of daily living (IADL) are generally covered by the patients through out-of-pocket expenditures (that might depend on income or wealth) or supplementary LTC insurances. However, the canton might decide to provide subsidies to cover at least partially the residual out-of-pocket expenditure.

3 Conceptual framework

There are several theoretical models providing guidance for optimal LTC policies (Jousten et al., 2005; Pestieau and Sato, 2008; Kuhn and Nuscheler, 2011). However, none of these models explicitly considers the role of culture in shaping LTC arrangement decisions. In this section we provide a simple conceptual framework to address this issue. Particularly, we investigate the impact of individual preferences on two outcomes: the dependency level at entry in nursing homes and, as a consequence, the relative provision of home-based care with respect to nursing homes.

Consider the following quasi-linear utility function:

$$U(C, LTC) = C + d\phi(LTC) \quad d \in [0, 1] \quad (1)$$

⁴Employment figures are in full-time equivalent.

⁵Notice that more than 50% of patients in nursing homes receive subsidies from local governments.

⁶The federal law was approved in June 13, 2008 and came into force in 2011.

⁷SR 832.10 - Federal law dated March, 18th 1994.

where C is consumption, ϕ is a continuous and concave function of LTC, and d is the intensity of care required by the elderly person, i.e. the dependency level. Equation (1) can be interpreted as either the household utility or the elderly person utility, depending on the subject making LTC choices. LTC can be measured in day units or in multiple-day units. Besides, if the elderly person is in good health, i.e. $d = 0$, the household does not spend any fraction of its income in LTC services.

LTC services can be further subdivided into home-based care (HB) and nursing home care (NH):

$$LTC = \delta HB + (1 - \delta)NH, \quad \delta \in [0, 1] \quad (2)$$

where δ is the preference parameter for home-based care. The two services are assumed to be perfect substitutes, since elderly people entering in nursing homes do not receive any home-based care and vice-versa.⁸

Assuming that the price of consumption is the denominator, the budget constraint is

$$C + p_h(d)HB + p_nNH = \omega, \quad p'_h(d) > 0 \quad (3)$$

where $p_h(d)$ is the price of home-based care, which is an increasing function of the dependency level, d . p_n is the price of nursing homes, and ω is the endowment of the household. If HB and NH are expressed in days of care, $p_h(d)$ can be interpreted as the price of one day of home-based care, which becomes progressively more expensive as the health condition of the elderly person deteriorates. In other words, worse health conditions may require more hours of care, increasing the daily cost of home-based care.⁹ For simplicity, we assume p_n to be independent of the health condition of the elderly person, since fixed-costs in a nursing home usually outweigh variable costs due to adverse health conditions.¹⁰ The Swiss LTC organization fits quite well this framework. Generally, the price paid for nursing home care does not vary with the intensity of care required by the elderly person and is based on a daily tariff. Conversely, home-based care is provided in hours. Therefore, the more adverse the health conditions of the patient, the larger the number of daily hours of home-based care required, and the higher the daily price of home-based care.

⁸Notice that this framework can be easily expanded to encompass the distinction between formal and informal care provision. Indeed, the home-based care variable HB can be further decomposed as $HB = (\theta IF^\rho + (1 - \theta)FM^\rho)^{\frac{1}{\rho}}$, where IF is the amount of informal care, FM is the amount of formal home-based care, θ is a preference parameter for informal care and ρ is the elasticity of substitution between the two. Notice that this framework allows for imperfect substitutability between formal and informal home-based care. Nevertheless, a thorough investigation of the interaction between formal and informal care is beyond the scope of this paper.

⁹In the case of formal home-based care this cost is monetary, while in the case of informal care this cost can be measured as the monetary value of the time spent by the caregiver.

¹⁰Nursing home prices also depend on the severity of the elderly person health status. Since fixed costs play a greater role in nursing homes than in home-based care, daily home-based care prices increase more rapidly with the severity of the elderly person health condition than daily nursing home prices, i.e. $p'_h(d) > p'_n(d)$.

As a result, it seems reasonable to assume that for low levels of dependency the price of one day in home-based care is lower than the price of one day in nursing homes, while for high levels of dependency home-based care is more expensive than nursing home care.

Using Equations (1)-(3), households are indifferent between nursing homes and home-based care if

$$\delta p_n = (1 - \delta)p_h(d). \quad (4)$$

In words, the elderly person enters the nursing home if the LHS is smaller than the RHS, that is when the weighted price of one day in nursing home is smaller than the weighted price of one day in home-based care. Prices are weighted by preferences for home-based care. While the preference parameter for home-based care, δ , increases the price of nursing homes, its complement, $1 - \delta$, increases the price of home-based care. Indeed, the higher the preference for home-based care, the smaller is the nursing home price required to induce entrance in a nursing home. Therefore, the threshold dependency level beyond which the elderly person enters the nursing home can be obtained from Equation (4) as

$$d^* = p_h^{-1} \left(\frac{\delta}{1 - \delta} p_n \right). \quad (5)$$

Notice that the inverse of a strictly increasing function is still an increasing function. Thus, the severity of the elderly person health condition at entry is positively related to the preference for home-based care and the price of nursing homes. Again, from Equation (4), the threshold preference parameter for entering a nursing home can be written as

$$\delta^* = \frac{p_h(d)}{p_n + p_h(d)}. \quad (6)$$

The preference parameter is positively related to the price of home-based care and to the dependency level, while it is negatively related to the price of nursing homes. This suggests that the higher the dependency level, the stronger must be the preference for home-based care to avoid entrance in a nursing home. Figure 4 shows graphically the results using a simple functional form for $p_h(d)$. For combinations of d and δ above the curve, the elderly person enters a nursing home, while for combinations of d and δ below the curve, the elderly person receives home-based care.

From a supply viewpoint, if the government (or the market) aggregates citizens' preferences for home-based care, other things being equal, the higher the δ in the population, the higher the provision of home-based care.

To sum up, from this simple conceptual framework, we obtain two preliminary results: (a) the severity of health conditions at entry in nursing homes is higher in areas with stronger preference for home-based care, and (b) if people are allowed to freely choose their preferred LTC arrangement option, LTC provision should reflect population preferences.

4 Data and descriptive statistics

The two main data sources are the statistics on socio-medical institutions (SOMED) and the home care survey (HCS) available from the Swiss Federal Statistical Office. SOMED is an administrative dataset containing data from nursing homes between 2006 and 2013. Each nursing home is required to transmit information about its clients, costs, revenues and personnel employed. Data about health care provision to clients are detailed and include length of stay, intensity of care received, type of arrangement within the nursing home, provenience and destination of the elderly. From 2007 on, a personal number is assigned to each client, allowing for consistent tracking of individuals over time. Given the nature of this dataset, there is limited information about socio-demographic characteristics of clients. However, for each individual we observe the place of residence before entering the nursing home, age and gender.

The other database of interest, the HCS, collects administrative data from home-based care providers. The time span of this database is between 2007 and 2013. However, data from for-profit providers have only been collected since 2010. Data about clients are aggregated by provider, and therefore it is not possible to make any inference about the intensity of care received by each person. The only available information is the number of clients receiving care, hours provided, and the number of cases by type of care and (for some types of care) age group. Type of care is subdivided into medical care, assistance in daily living activities, meals provision and other services. For medical assistance and assistance in daily living activities the number of hours provided and the number of cases are subdivided into five age groups: 0-4, 5-19, 20-64, 65-79, 80+.

Dependency is usually defined as the quality of being dependent, i.e. requiring someone else to receive support. In the following we refer to the dependency level as the intensity of care received within the nursing home. Before 2011 the measurement scales adopted for reporting the intensity of care were not uniform across cantons. Hence, our dependency level measure rests on 14 different measurement scales. Given that each scale can be converted into minutes of care provided, it was possible to harmonize the dependency levels by collapsing the different scales in one major scale ranging from 1 to 4. Elderly people who did not receive any treatment were assigned a 0. As shown by Figure 3, dependency levels are generally higher in French- and Italian-speaking areas.

Another possible indicator of dependency is age. Indeed, the older an individual, the higher the likelihood of physical and mental impairments. However, we expect age to be a more noisy indicator of frailty with respect to the dependency level. Indeed, risky health behaviors adopted during the whole life-cycle may affect health at older age. For example, a heavy smoker may be in worse shape with respect to a non-smoker of the same age. This observation is crucial

in our context. Indeed, while Latin-speaking communities are more reluctant to enter in nursing homes compared to their German-speaking counterparts (CreditSuisse, 2015), they also show worse health-related behaviours (Marti et al., 2015). Thus on the one hand, the elderly in Latin-speaking communities would enter later in nursing homes for cultural reasons. On the other hand, the more risky health behaviors imply worse health conditions with respect to the elderly in German-speaking communities, inducing earlier institutionalization. For this reason, we prefer to focus the main analysis on dependency levels. However, we replicate the analysis for age as a robustness check (results are not reported here but are available upon request).

Particularly, we focus on the dependency level “at entry” to avoid the confounding factor of nursing home treatment. More details regarding the construction of the dependency level at entry are provided in Appendix A.

The empirical analysis of the paper is conducted at two different levels of aggregation: the district and the individual. District data are first used to show evidence on cultural differences in LTC use across Switzerland, both for nursing home care and home-based care (Section 5.1). In choosing the level of aggregation for this part of the analysis, we prefer districts to municipalities. Even though municipalities are directly involved in the provision of LTC services, agreements on LTC provision across neighboring municipalities may invalidate the analysis. Indeed, both nursing homes and home-based care providers usually take care of clients residing in different municipalities to exploit economies of scale from service provision, especially in rural environments. Districts cover larger areas, and agreements among municipalities are less likely to be relevant at this aggregation level.

Panel A of Table 1 shows the descriptive statistics for the variables of interest at district level. *Dependency level at entry* ranges on a scale from 0 to 4, and shows a mean of 1.8 and a standard deviation of 0.52. *Age at entry* is the district average age at entry in nursing homes. To compute this variable we chose the first spell of entry applying the same algorithm used to compute the dependency level at entry. *Home-care hours* is the share of people above 65 years old receiving medical care or assistance for daily living activities. *Latin language* captures the role of culture and is computed as the share of people speaking French, Italian or Romansh out of total resident population. Data about the main language spoken are drawn from the Federal Statistical Office (FSO). Given that for smaller cantons the district coincides with the canton, the within-canton variation in the language spoken is 0 for 8 out of 26 cantons.¹¹ Of course, within canton variation is larger for bilingual and trilingual cantons but there is still variation to exploit in the other

¹¹Namely, these cantons are Appenzell Innerrhoden, Basel-Stadt, Geneva, Glarus, Nidwalden, Obwalden, Uri and Zug.

cantons. To understand whether the prevalent language spoken in a district captures the variation in population preferences, we collect data about the referendum on the introduction of a constitutional article promoting work-life balance.¹² Particularly, this referendum approved an amendment to the Swiss Constitution committing the cantons to provide complementary day care facilities to help the reconciliation between work and family duties, and allowing the Confederation to intervene whenever cantonal efforts are insufficient. This referendum took place in 2013 and the *Referendum* variable refers to the share of people voting ‘yes’. Finally, *Urbanization*, *NHs price*, *Share over 65*, *Death rate* and *Imposable income* are used as control variables. *Urbanization*, *Share over 65* and *Death rate* are all collected from the FSO. *Urbanization* is a categorical variable ranging from 1 to 3. In particular, 1 corresponds to the highest level of urbanization and 3 to the lowest. *Share over 65* is the share of people above 65 years old out of the overall district population. Since population data by age are not available before 2010, we project the share of elderly people in 2010 on the population between 2007 and 2009. *Death rate* is the ratio between the number of deaths in a year and the overall population. *NHs price* is the average price of one day of care in nursing homes. Given that more detailed measures of prices are not available, we divide the total revenue of nursing homes in the district by the number of clients. *Imposable income* is the logarithm of imposable income and is drawn from the Federal Tax Administration (FTA).

In the second part of the empirical analysis (Section 5.2), we instead use individual data to analyze the discontinuity in entry decision in nursing home at the linguistic border in the three bilingual cantons.

5 Empirical analysis

As noted before, this section is subdivided into two subsections: district-level analysis and regression discontinuity design. First, the district-level analysis presents some insights about differences in nursing home and home-based care use between Latin- and German-speaking districts. In doing so, it exploits the variation in the share of municipalities speaking Latin languages within the district. Then, a regression discontinuity design is adopted to provide a more causal insight about the role of culture in nursing home use in the three bilingual cantons.

5.1 District-level analysis

Cultural differences in preferences about LTC arrangements may translate into differences in the dependency level of institutionalized elderly people. To get a first grasp of the magnitude of

¹²The referendum concerns the approval of the federal law FF 2012 5223.

this effect we regress the dependency level at entry on the share of municipalities speaking Latin languages within the district. The results are presented in the upper part of Table 2. The first column contains year fixed effects and one time-invariant control, i.e. the level of urbanization. Latin-speaking districts show higher dependency levels with respect to German-speaking districts. Particularly, moving from a German-speaking district to a Latin-speaking district the average dependency level increases by 0.6, which is more than 100% of the standard deviation.

Current levels of utilization of LTC services are the result of both demand-side and supply-side factors. Since LTC is planned at cantonal level, the inclusion of cantonal dummies should account for differences in supply factors. However, given the endogeneity of public policies, canton fixed effects also capture part of the variation due to cultural factors. As shown in column 2 of Table 2, adding cantonal fixed effects decreases the point estimates. Still, the Latin-German gap remains significant, accounting for 25% of the standard deviation. Also, the coefficient of *Latin language* is robust to the inclusion of cantonal time trends and time-varying controls. Finally, it is worth noting that time varying controls also include dummies for the different scales adopted to measure the dependency level. The inclusion of these dummies serves as a robustness check for the comparability of dependency levels across districts. For the sake of completeness, in the last column of Table 2 we report the estimates with the logarithm of income as a control variable. In this case, the lack of income data in 2012 and 2013 reduces the number of observations available but does not substantially affect the results.

The bottom part of Table 2 shows whether there is a systematic relationship between home-care provision and language spoken by district. Speaking a Latin language is associated with an increase in home-based care utilization by about 3 hours per elderly person. The number of observations is lower than before because home-based care providers are not present in all districts over time, precisely before 2010 when data from for-profit providers were not collected. The coefficient of *Latin language* is not robust to the inclusion of canton fixed effects, but becomes significant again after the inclusion of cantonal time trends and time varying controls.

Overall, the above results might suggest some substitutability between LTC services. Indeed, districts where elderly people enter in nursing homes with higher need for care also resort to home-based care services more often. This intuition will be further developed in discussing Table 4.

For the moment, let us focus on the variation captured by the *Latin language* coefficient. To show that language is capturing the variation in preferences, we consider the relationship between language and voting behavior. Particularly, we use data from a 2013 referendum on family policy to show that the cultural effect captured by *Latin language* corresponds to the actual variation in pref-

erences in the population.¹³ The results are summarized in Table 3. When language and referendum outcomes are separately included in the regressions (column 1 and 2), they both have positive and significant effect on *Dependency level at entry*. However, once both variables are included in the same regression (column 3) their significance disappears, and the variance inflation factors for *Latin language* and *Referendum* increase by 90%. This suggests that referendum outcomes are collinear to language. Moreover, the R-squared is fairly unaltered across the three models, stressing the idea that these variables are capturing the same variation. Concerning *Home-care hours*, the coefficients of *Latin language* and *Referendum* are still positive and significant when included separately in the regressions (column 1 and 2). However, only the *Referendum* coefficient remains significant when both variables are included in the same regression (column 3), while the coefficient of *Latin language* becomes negative and insignificant. This suggests that social preferences are the main driver of differences in home-based care use. Using the 2007 referendum about the introduction of a unique public health care provider entails the same results. All in all, these results clearly indicate that differences in LTC arrangements across linguistic areas are the product of different social preferences, and this will be further confirmed by the RDD analysis in next Section.

Table 4 further explores the source of substitutability between LTC services. Column 1 shows the results after regressing the dependency level on home-based care use. The coefficient of *Home-care hours* is positive and significant, suggesting that increasing home-based care use by 1 hour per person increases the dependency level at entry by 0.013. In other words, higher utilization of home-based care is associated with people entering in nursing homes with higher dependency levels. However, column 2 of Table 4 shows what happens to the previous estimated coefficients after the inclusion of language. The coefficient for home-based care is not statistically different from 0 anymore, while the coefficient for language is positive and significant. Since *Latin language* does not vary over time, these results indicate that the substitutability between home-based care and nursing homes is driven by the “between” component rather than the “within” component, i.e. that the differences in dependency levels at entry are driven by differences across districts, rather than changes in LTC use within districts over time. This is particularly important from a policy viewpoint: if higher dependency levels at entry in nursing homes are driven by cultural factors, an increase in the availability of home-based care might not lead to higher utilization of home-based care. Rather, a more thorough intervention aimed at changing people’s attitudes towards formal care services would be needed. Adding canton fixed effects, cantonal time trends and time varying controls does not alter the main results.

¹³As a remainder, the 2013 referendum approved an amendment to the Swiss Constitution introducing the commitment for the cantons to promote reconciliation between work and family life and allowing the Confederation to intervene whenever the cantonal effort is insufficient.

All the standard errors estimated in this section are robust and clustered at district level. As a robustness check, we replicate all the estimations discussed above using age at entry instead of dependency levels at entry and the results are qualitatively similar.¹⁴ Finally, as an additional robustness check, we control for the influence of different religious affiliation on LTC arrangement decisions. Even though linguistic areas are well defined, religions are less uniform on the territory, with catholics and protestants being distributed across both Latin- and German-speaking areas. As one might expect, Catholic areas show higher dependency levels at entry with respect to protestant areas. However, religion only partially accounts (less than 15%) for the language gradient in LTC arrangements described before (results are available upon request).

5.2 Regression discontinuity design

To causally identify the role of culture, we exploit the language divide in bilingual cantons as a source of randomized variation within the canton. Given that from the SOMED statistics we are able to back up the previous municipality of residence of institutionalized clients, we can contrast the dependency levels of individuals living on different sides of the linguistic border. Regression discontinuity appears to be the best identification strategy in this context. In determining the impact of culture on social preferences, Eugster et al. (2011) adopt a fuzzy design exploiting the jump in the probability of speaking French across the two sides of the linguistic border. According to their estimates, the share of the French-speaking population to the right-hand side of the linguistic border is 85%, while the share of the French-speaking population to the left-hand side of the linguistic border is about 10%. Therefore, the change in the language spoken at the border is quite sharp. In our context, we are not aware of the language spoken by the elderly people in the sample. Hence, we refer to Eugster et al. (2011) for the first stage estimates of the fuzzy design, while we focus on the reduced form. Following their approach, we define the treatment as being a resident of the French-speaking area, while the assignment variable is the distance from the linguistic border. Municipalities at the border are defined as those French-speaking municipalities bordering with at least one German-speaking municipality. Thus, French-speaking municipalities at the linguistic border are assigned a distance of 0 from the border, while all the other French-speaking municipalities are assigned a positive number which corresponds to the kilometric travel distance from the closest French-speaking municipality at the border. In the same way, all the German-speaking municipalities are assigned a negative number which corresponds to the kilometric travel distance from the closest French-speaking municipality. The reduced form equation for the linear

¹⁴The coefficient of *Latin language* is 0.7 without canton fixed effects and drops to 0.4 after the inclusion of canton fixed effects. However, since age at entry is a more noisy health indicator than dependency levels, standard errors are larger and the coefficients are not always statistically significant.

local estimation is:

$$Y_i = \beta_0 + \beta_1 F_i + \beta_2 dist_i + \beta_3 Z_i + \beta_4 F_i dist_i + \varepsilon_i \quad (7)$$

where Y_i is the outcome variable, F_i is a dummy for the treatment, $dist_i$ is the assignment variable, Z_i represents the set of covariates and ε_i is a stochastic error term. The coefficients of interest in this regression are β_0 and β_1 . β_0 represents the average dependency level when $F_i = 0$, that is in the German-speaking region. Consequently, β_1 represents the average treatment effect, i.e. the difference in dependency levels between the French-speaking and the German-speaking areas. Indeed, when $F_i = 1$, the average dependency level in the French-speaking region after controlling for all the other covariates is $\beta_0 + \beta_1$. The covariates of interest in this framework are gender and canton of residence. Given that LTC policies are set at cantonal level, controlling for cantons is fundamental to ensure a correct comparison of observations across the linguistic border. The interaction term between the treatment and the assignment variable accounts for the possibility of different linear trends on either side of the discontinuity. Given the local nature of the regression discontinuity, the choice of the bandwidth for the assignment variable is very important. On the one hand, the closer the observations to the discontinuity, the less noisy the estimated average treatment effect β_1 . On the other hand, when the bandwidth is too narrow, the resulting estimates may show little predictive power. Therefore, there is a trade-off between bias and precision. In our case the assignment variable for the whole sample ranges from -140 km to 85 km. In the next subsection we check the sensitivity of the results using different bandwidths, i.e. 25-km, 50-km and 100-km.

Moreover, we also check the sensitivity of the results to different polynomial specifications to account for the presence of non-linearity in the true functional form. The choice of the polynomial order also depend on the choice of the bandwidth. In general, for narrower bandwidths the linear approximation seems a reasonable assumption. However, the larger the bandwidth, the larger the probability of non-linearities in the true functional form. For this reason, we also provide different estimates of the spatial RDD model using the full sample but different polynomial specifications. The standard errors estimated in the next subsection are all robust and clustered at municipal level.

Panel B of Table 1 presents the descriptive statistics for the whole sample and for each side of the linguistic border. The only additional variable in this panel is gender, which is a dummy equal to 1 for men. Note that the dependency level is higher in the French-speaking part than in the German speaking part, as previously discussed for Figure 3. Similar differences are also evident for the age at entry. On the contrary, the average for the gender dummy is stable across the two linguistic areas. Mean comparison tests for *Dependency level at entry* and *Age at entry* reject the

null of equal means, while the mean comparison test for *Gender* cannot reject the null.

5.2.1 RDD results

For purely descriptive purposes, Figure 5 represents the cloud of bins for the referendum variable described above in the three bilingual cantons. While Eugster et al. (2011) use data from all the municipalities in these cantons, we focus on the municipalities of previous residence of nursing home patients. Moreover, in computing the residuals we also control for canton and urbanization. The discontinuity in preferences at the linguistic border is striking, with French-speaking municipalities being more favorable to the introduction of a constitutional article promoting work-life balance. This graph shows differences in social preferences of people across the linguistic border and corroborates our idea of significant differences in culture between the two sides of the linguistic border.

Figure 6 depicts the cloud of bins for dependency level at entry after controlling for canton, sex, year and urbanization. Even in this case there is a jump at the linguistic border, with French-speaking individuals showing higher dependency levels at entry with respect to German-speaking individuals.¹⁵ However, regression discontinuity results are valid as long as individuals on either side of the linguistic border are similar in terms of all their observable and unobservable characteristics. In our sample we can test this assumption checking the continuity in the density of the available control variables at the cut-off. Gender is the only control available at individual level and is represented in Figure 7, while the other four control variables — the share of elderly above 65 years old out of overall population, the degree of urbanization, death levels and imposable income— are available at municipal level and presented in Figure 8. Confidence intervals are never disjoint for all the control variables, supporting the validity of the continuity assumption.

Results of the spatial RDD are presented in Table 5. As aforementioned, the first three columns display the sensitivity of the estimated coefficients to different bandwidths, namely 25-km, 50-km and 100-km. The average treatment effect for the dependency level —the coefficient β_1 in equation (7)—is always significant and ranges from 0.12 to 0.18. This means that French-speaking individuals show, on average, from 0.12 to 0.18 higher dependency levels compared to German-speaking individuals. Focusing on the most conservative estimate obtained with the 25-km bandwidth, we

¹⁵Even though the graphical analysis reports significant discontinuities for larger bandwidths, we decided to focus on the narrowest bandwidth because of difficulties in interpreting the graphical evidence further away from the linguistic border. As a matter of fact, not all the cantons show observations for the whole range of the assignment variable. On the German-speaking side, Fribourg does not have any municipality beyond 20 kilometers from the linguistic border. Conversely, the French-speaking side Berne does not have any municipality beyond 30 kilometers from the linguistic border. Thus, to avoid institutional-driven distortion in the graphical analysis we report graphical evidence for the 25-km bandwidth.

see that the estimated effect represents 12% of the standard deviation. Columns 4 and 5 of Table 5 show the results for higher order polynomial fits. The treatment coefficients are still significant and rather stable across different polynomial specifications.

Finally, to back up the estimates of the true effect of language on dependency levels, the coefficient β_1 estimated above should be inflated according to the impact of being treated (i.e. residing in the French-speaking region) on the language spoken. To this end, we rely on the estimates by Eugster et al. (2011). In their preferred specification, the impact of the treatment on language is 0.7535. Hence, the above coefficients should be multiplied by a factor of 1.327 ($1/0.7535$). In our case, considering the 25-km bandwidth, the implied coefficient is 0.15. This means that accounting for the actual probability of residing on one side of the linguistic border and speaking the same language, French-speaking people show a 0.15 higher dependency level at entry than German-speaking people, which represents 16% of the standard deviation.

6 Conclusions

This paper investigates the role of culture in shaping LTC arrangement decisions. Analysing data from Switzerland, a multi-cultural confederation of 26 states and 4 languages, we find that culture plays an important role in determining LTC arrangements. In particular, people residing in the French-speaking part of the country show higher formal home-based care use, and enter in nursing homes with higher dependency levels with respect to people residing in the German-speaking area. This is particularly relevant from a policy maker viewpoint, because interventions on the LTC market should correctly internalize the behavioural responses of the population, either in a cost containment or in a welfare maximization perspective.

From the district-level analysis we find that elderly people residing in the French-speaking area use 3 more hours of home-based care on average, and show 0.13 higher dependency levels. The results are robust to the inclusion of several controls at cantonal and district levels. Moreover, the use of political preferences (i.e. votes) on a referendum about the introduction of a constitutional article promoting work-life balance clearly indicates that the language spoken captures the same variation in preferences due to cultural differences. Finally, there is a positive and significant correlation between home care use and dependency levels at entry in nursing homes. However, this correlation loses statistical significance once cultural factors are included in the regression, suggesting that the negative correlation between the two services is driven by cultural differences.

To provide a more causal insight about the role played by culture on LTC preferences we use a spatial RDD that exploits the language border across three bilingual cantons. Adopting different bandwidths and polynomial specifications we find that the French-German gap in the dependency

levels at entry accounts for roughly 16% of the standard deviation.

The observed cultural differences in LTC arrangements could be explained by different preferences for state intervention in the provision of elderly care, different family ties or different degrees of trust towards social sector organizations between the German cultural group and the Latin cultural group. Moreover, culture is likely to play a role in informal care provision as well, and on the extent of the substitutability between informal care and formal care arrangements. Future research is needed to address these issues.

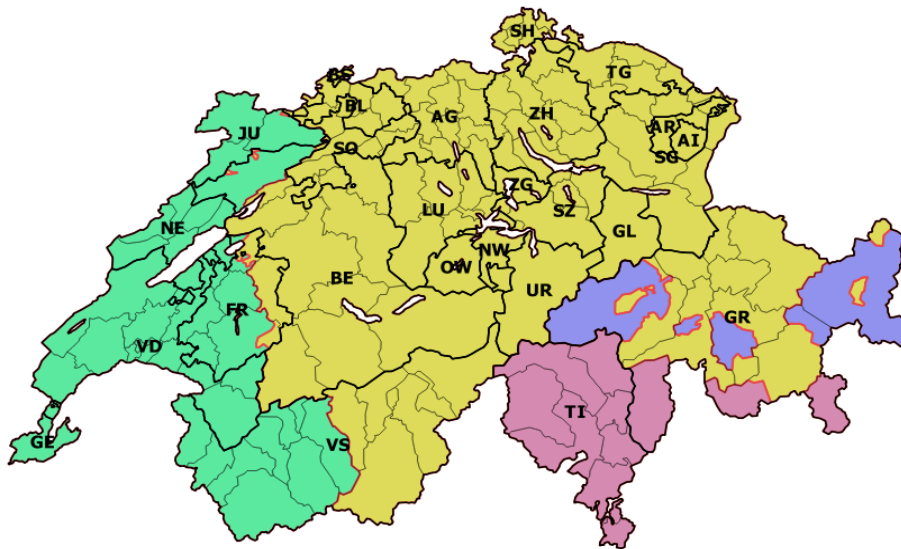
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Figure 1: Linguistic areas across Switzerland



Sources: Base maps: ©OFS, ThemaKart.

Notes: Colors correspond to different linguistic areas. Particularly, the green corresponds to the German-speaking area, the pink to the French-speaking area, the dark-blue to the Italian-speaking area, and the light-blue to the Romansh-speaking area. Labels refer to the cantons: ZH - Zürich, BE - Bern, LU - Luzern, UR - Uri, SZ - Schwyz, OW - Obwalden, NW - Nidwalden, GL - Glarus, ZG - Zug, FR - Fribourg, SO - Solothurn, BS - Basel-Stadt, BL - Basel-Landschaft, SH - Schaffhausen, AR - Appenzell Ausserrhoden, AI - Appenzell Innerrhoden, SG - St. Gallen, GR - Graubünden, AG - Aargau, TG - Thurgau, TI - Ticino, VD - Vaud, VS - Valais, NE - Neuchâtel, GE - Genève, JU - Jura.

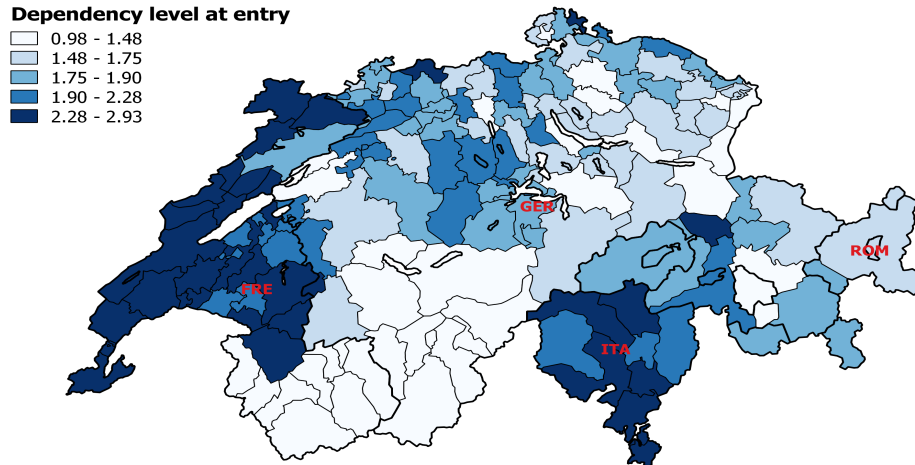
Figure 2: Linguistic areas across Switzerland



Sources: Base maps: ©OFS, ThemaKart.

Notes: The areas drawn in the map correspond to different linguistic areas. Label correspondence: FRE - French, GER - German, ITA - Italian, ROM - Romansh.

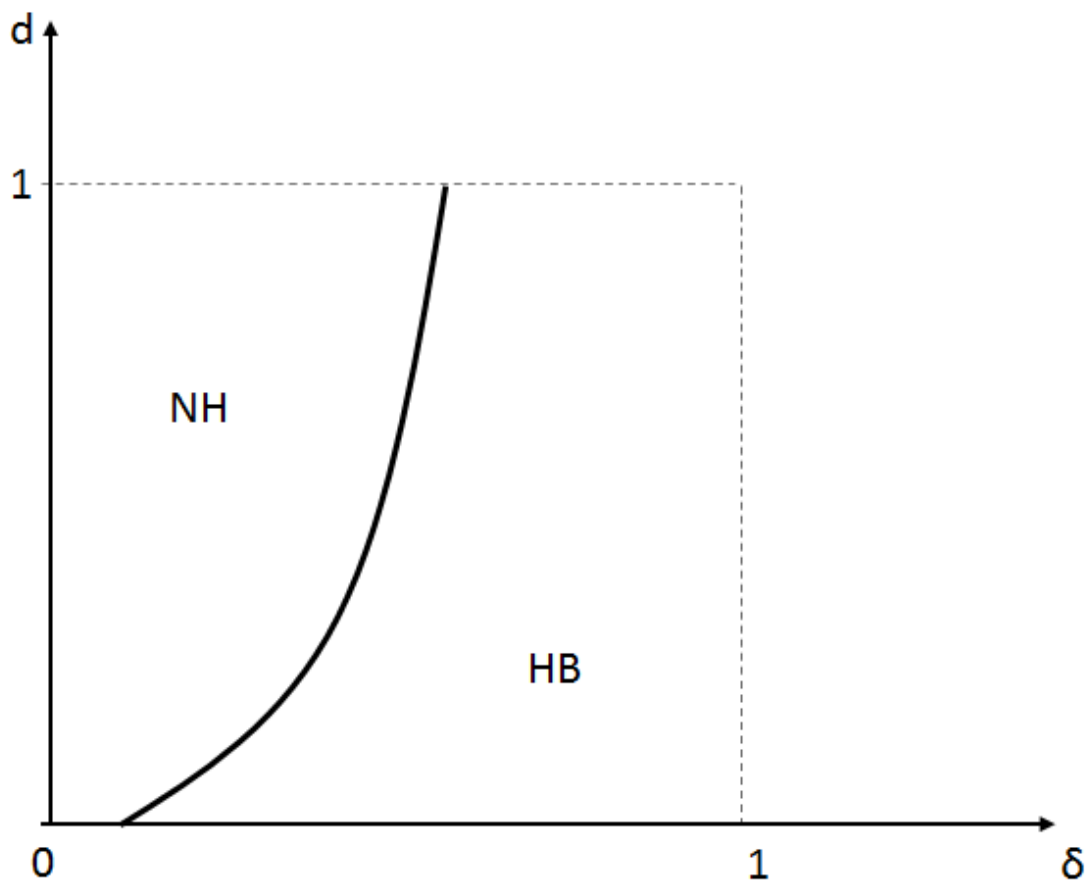
Figure 3: Dependency level at entry by district and linguistic area



Sources: Base maps: ©OFS, ThemaKart.

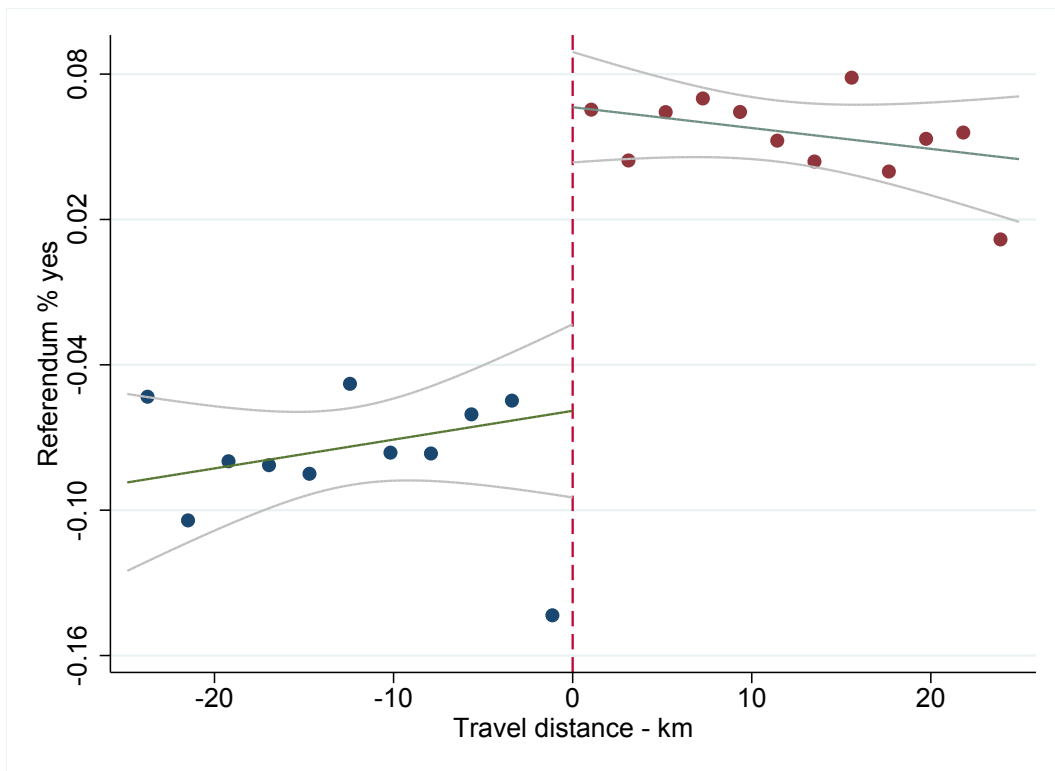
Notes: Thick-line borders show linguistic areas: FRE - French, GER - German, ITA - Italian, ROM - Romansh. Smaller areas correspond to districts.

Figure 4: The relationship between the severity of the health condition and the preference parameter for home-based care



Notes: Graph drawn according to the functional form $p_h(d) = \alpha + \beta d$, where α can be interpreted as the fixed component of home-based care price with respect to the severity of the elderly person health condition, and β can be interpreted as the variable component of home-based care price with respect to the severity of the elderly person health condition. Then, $d^* = \frac{\delta(p_n + \alpha) - \alpha}{(1 - \delta)\beta}$.

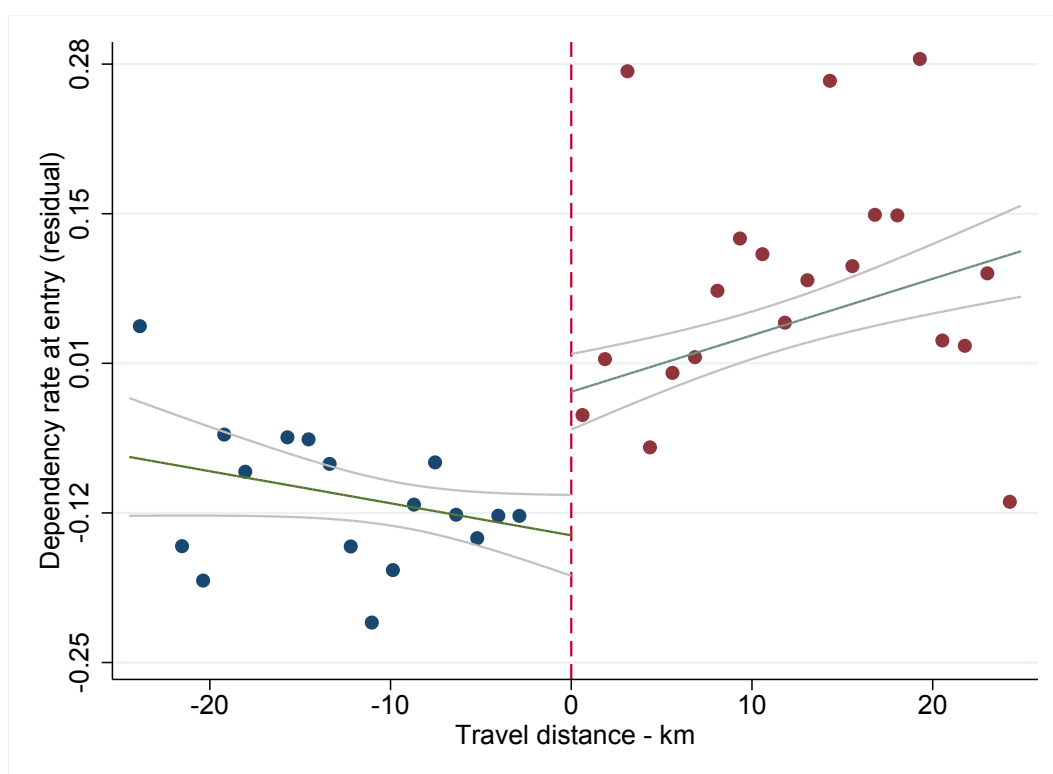
Figure 5: Distribution of preferences for family policies across the linguistic border



Sources: Elaboration on Swiss Federal Statistical Office data.

Notes: The number of bins is automatically computed by the *cmogram* command of Stata 14 and corresponds to $\#bins = \text{minsqrt}(N), 10 * \ln(N) / \ln(10)$, where N is the (weighted) number of observations. Positive values on the x-axis correspond to the kilometric travel distance from the linguistic border of French-speaking municipalities, while negative values correspond to the kilometric travel distance from the linguistic border of German-speaking municipalities.

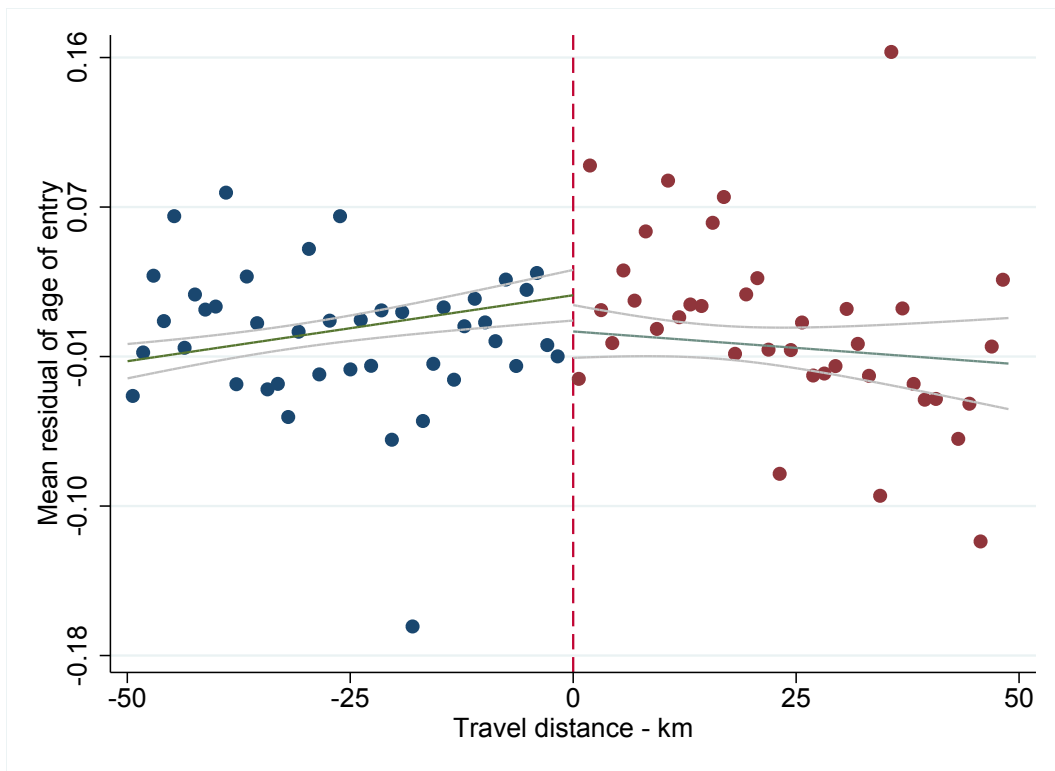
Figure 6: Distribution of dependency levels at entry across the linguistic border



Sources: Elaboration on SOMED data.

Notes: The number of bins is automatically computed by the *cmogram* command of Stata 14 and corresponds to $\#bins = \text{minsqrt}(N), 10 * \ln(N) / \ln(10)$, where N is the (weighted) number of observations. Positive values on the x-axis correspond to the kilometeric travel distance from the linguistic border of French-speaking municipalities, while negative values correspond to the kilometeric travel distance from the linguistic border of German-speaking municipalities.

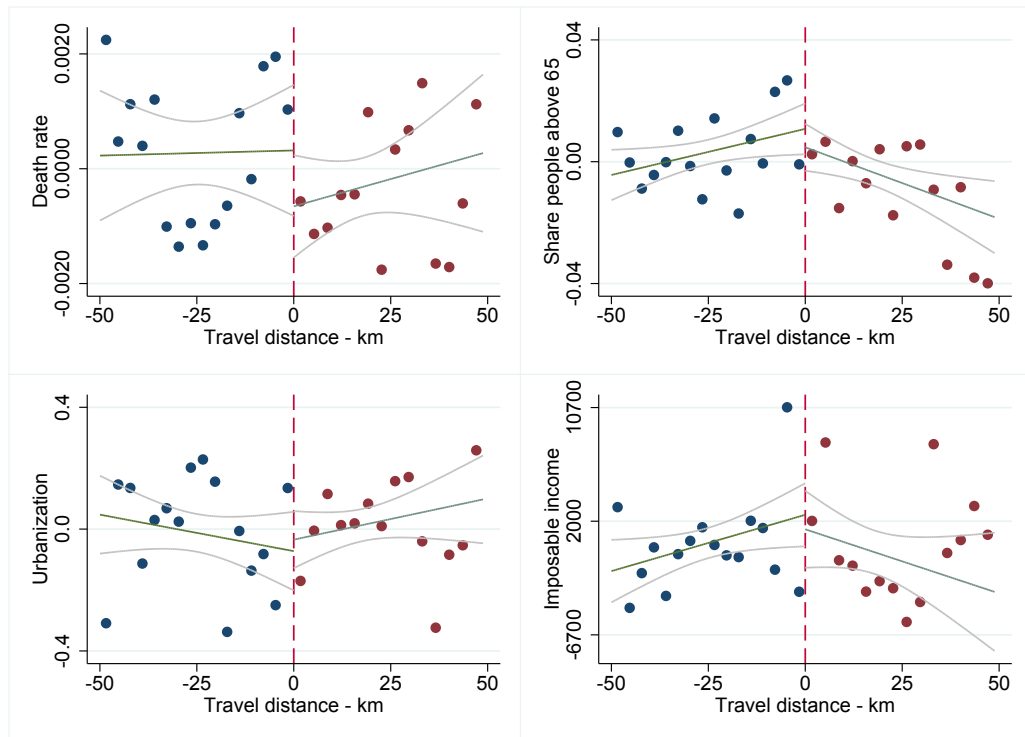
Figure 7: Distribution of males across the linguistic border



Sources: Elaboration on SOMED data.

Notes: The number of bins is automatically computed by the *cmogram* command of Stata 14 and corresponds to $\#bins = \text{minsqrt}(N), 10 * \ln(N) / \ln(10)$, where N is the (weighted) number of observations. Positive values on the x-axis correspond to the kilometric travel distance from the linguistic border of French-speaking municipalities, while negative values correspond to the kilometric travel distance from the linguistic border of German-speaking municipalities.

Figure 8: Distribution of control variables across the linguistic border



Sources: Elaboration on Swiss Federal Statistical Office data.

Notes: Data points are restricted to the municipalities of the institutionalized individuals in the sample. The number of bins is automatically computed by the *cmogram* command of Stata 14 and corresponds to $\#bins = \text{minsqr}(N), 10 * \ln(N) / \ln(10)$, where N is the (weighted) number of observations. Positive values on the x-axis correspond to the kilometric travel distance from the linguistic border of French-speaking municipalities, while negative values correspond to the kilometric travel distance from the linguistic border of German-speaking municipalities.

Table 1: Descriptive statistics

Panel A: *District level*

Variable	Observ.	Mean	Std. Dev.
Dependency level at entry	1,036	1.80	.52
Age at entry	1,036	83.10	2.01
Home-care hours	959	8.52	5.88
Latin language	1,036	.33	.39
Referendum (% 'yes')	1,036	.51	.12
Urbanization	1,036	2.55	.41
NHs price	1,036	241.10	38.41
Share over 65	1,036	.17	.02
Death rate	1,036	.01	.00
Imposable income (log)	740	10.36	.20

Panel B: *Individual level*

Variable	Observ.	Mean	Std. Dev.
Dependency level at entry	43,902	1.69	.93
Age at entry	43,902	83.54	9.19
Gender	43,902	.34	

	<i>French</i>		<i>German</i>		t-test
Variable	Obs.	Mean	Obs.	Mean	P-value
Dependency level at entry	10,584	1.91	33,318	1.62	0.011**
Age at entry	10,584	83.83	33,318	83.45	0.008***
Gender	10,584	.33	33,318	.34	0.254

Notes - *PANEL A* - *Age at entry*, *Dependency level at entry*, *NHs price* are drawn from the SOMED statistics; *Home-care hours* is drawn from the HCS survey; *Latin language*, *Referendum*, *Urbanization*, *Share over 65*, *Death rate* are drawn from the Federal Statistical Office. *Imposable income* is drawn from the Federal Tax Administration. All the data are aggregated at district level and refer to the period 2007-2013. The number of observations for *Home-care hours* is lower because home-based care providers are not present in all districts and years. Income data are in logs and observations for 2012 and 2013 are not available. *PANEL B* - *Age at entry*, *Dependency level at entry* and *Gender* are drawn from the SOMED statistics. These data refer to the cantons of Berne, Fribourg and Valais for the period 2007-2013 and are reported at individual level. P-value refers to a t-test for mean comparison between French-speaking and German-speaking individuals. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 2: Difference in dependency levels at entry and home-based care use by linguistic region

	Model 1	Model 2	Model 3	Model 4	Model 5
<i>Dependency level at entry</i>					
Latin language	0.609*** (0.09)	0.130** (0.05)	0.130** (0.05)	0.130** (0.05)	0.141** (0.05)
Observations	1,036	1,036	1,036	1,036	740
R-squared	.242	.645	.769	.812	.829
<i>Home-care hours</i>					
Latin language	3.612** (1.58)	2.559 (1.76)	2.716* (1.60)	3.123* (1.61)	3.305** (1.51)
Observations	959	959	959	959	671
R-squared	.055	.175	.257	.275	.384
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Canton fixed effects	No	Yes	Yes	Yes	Yes
Cantonal time trends	No	No	Yes	Yes	Yes
Time varying controls	No	No	No	Yes	Yes
Imposable income (log)	No	No	No	No	Yes

Notes - All the estimates contain one time-invariant control variable, i.e. *Urbanization*. Time varying controls include *NHs price*, *Share over 65*, *Death rate* and dummy variables for the measurement scales adopted. The number of observations for *Home-care hours* is lower because home-based care providers are not present in all districts and years. Income data are in logs and observations for 2012 and 2013 are not available. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors (in parenthesis) are robust and clustered at district level.

Table 3: Difference in dependency levels at entry and home-based care use by linguistic region and voting behavior for family policies

	Model 1	Model 2	Model 3
<i>Dependency level at entry</i>			
Latin language	0.130** (0.05)		0.101 (0.07)
Referendum (% 'yes')		0.393** (0.18)	0.152 (0.23)
Observations	1,036	1,036	1,036
R-squared	.812	.811	.812
<i>Home-care hours</i>			
Latin language	3.123* (1.61)		-0.050 (2.27)
Referendum (% 'yes')		16.686** (6.48)	16.797* (8.79)
Observations	959	959	959
R-squared	.275	.286	.286
Year fixed effects	Yes	Yes	Yes
Canton fixed effects	Yes	Yes	Yes
Cantonal time trends	Yes	Yes	Yes
Time varying controls	Yes	Yes	Yes

Notes - All the estimates contain one time-invariant control variable, i.e. *Urbanization*. Time varying controls include *NHs price*, *Share over 65*, *Death rate* and dummy variables for the measurement scales adopted. The number of observations for *Home-care hours* is lower because home-based care providers are not present in all districts and years. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors (in parenthesis) are robust and clustered at district level.

Table 4: Substitutability between home-based care and nursing homes

	Model 1	Model 2	Model 3	Model 4
<i>Dependency level at entry</i>				
Home-care hours	0.013** (0.01)	0.004 (0.00)	-0.001 (0.00)	0.001 (0.00)
Latin language		0.649*** (0.11)	0.143** (0.06)	0.139** (0.06)
Observations	959	959	959	959
R-squared	.070	.264	.654	.810
Year fixed effects	Yes	Yes	Yes	Yes
Canton fixed effects	No	No	Yes	Yes
Cantonal time trends	No	No	No	Yes
Time varying controls	No	No	No	Yes

Notes - All the estimates contain one time-invariant control variable, i.e. *Urbanization*. Time varying controls include *NHs price*, *Share over 65*, *Death rate* and dummy variables for the measurement scales adopted. The number of observations for *Home-care hours* is lower because home-based care providers are not present in all districts and years. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors (in parenthesis) are robust and clustered at district level.

Table 5: Regression discontinuity design results

Bandwidth:	25 km	50 km	100 km	Full sample	Full sample	Full sample
Polynomial fit:	Linear	Linear	Linear	Quadratic	Cubic	Quartic
	<i>Dependency level at entry</i>					
Treatment effect (β_1)	0.115** (0.05)	0.178*** (0.04)	0.142*** (0.04)	0.167*** (0.04)	0.169*** (0.04)	0.146** (0.06)
Baseline dependency level at entry (β_0)	1.546*** (0.03)	1.525*** (0.02)	1.575*** (0.03)	1.502*** (0.03)	1.457*** (0.04)	1.474*** (0.05)
Observations	13,356	28,875	42,195	43,893	43,893	43,893
Canton fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes - All the estimates contain canton fixed effects and *Gender* as control variables. This regression table focuses on the three bilingual cantons: Berne, Fribourg and Valais. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors (in parenthesis) are robust and clustered at municipal level.

A Construction of the Dependency level measure at entry

The assessment of the dependency level at entry in nursing homes is quite challenging since patient needs are not assessed immediately after entry. However, patient dependency can be measured by the intensity of the first care event received after entry. Given that not all patients enter in nursing homes with the intent to stay for a long period, we exclude from the sample temporary residents.¹⁶ Indeed, nursing homes may host temporary patients needing a rehabilitation period after hospitalization. These observations could bias our estimates because entrance in nursing homes for these people is not the result of a choice, but only a temporary accommodation. Then, even among the long-stayers, there are individuals with a large number of spells, going back and forth from the nursing homes several times in a year. The inclusion of these individuals might represent a problem for the estimation as well. This is because the first spell of entry could be very short while the actual entry date could be in the following years. Therefore, to avoid distortions, we adopt a simple algorithm. First, we keep all those elderly individuals that show a single spell in time. Then, among those showing repeated spells (around 4% of the individuals) we select the actual entry date according to the destination of the elderly person after institutionalization, the length of stay and the length of time spent outside the nursing home. Particularly, we keep the first entry date if the individual did not go back home for more than 6 months. This means that if an individual went to the hospital after institutionalization and then re-entered the nursing home, we consider the first entry date as the actual entry date. Conversely, if the individual went back home for more than 6 months before entering again, we exclude the first spell and we apply the same criterion to the second entry date. If the individual went back home for more than 6 months even after the second spell, we also exclude the second spell and we apply the same criterion to the third spell and so on. Of course, if an individual in his first spell of entry stayed for more than one year and then went back home for more than 6 months before entering again, we keep the first spell.

Finally, the last problem concerns the dependency level at entry for those people who entered the nursing home in the last months of the year. Since the dataset reports only the ending date of each treatment, for those entered in the last part of the year, care spell recording is disproportionately likely to take place in the following year. To avoid this, if there is no care record available during the first year for people entering a nursing home between October and December, we consider the intensity of care received in the second year.

¹⁶In the SOMED statistics there is a specific variable indicating whether (a) the individual entered the nursing home with the intention to stay for a long time, (b) the individual entered the nursing home with the intention to stay for a short time and (c) the individual entered the nursing home only for day-care activities but did not stay overnight.

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