Language Diversity in Urban Landscapes: An Econometric Study

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Summary

This multidisciplinary study adopts econometric analysis for investigating how different characteristics determine the choice of the language used in the signs of a shopping street. We work with a dataset containing about 200 observations collected in the main shopping streets of the cities of Donostia (Spain) and Ljouwert (The Netherlands). The results corroborate the important assumption that multilingualism and the choice of the language (even in a street sign) is an individual and a social preference. Therefore, understanding individuals' linguistic preference structures is preliminary to the target and design of proper linguistic and social policies.

Keywords: Linguistic Diversity, Street Sign, Probit Model, Linguistic Landscape

JEL Classification: C010, R200, Z130

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1. Introduction

The study of the languages used in signs can contribute to the study of linguistic diversity. It can reflect the different strengths of the languages and the relative integration of their speakers. The languages of signs are also related to identity and to language policy. The effects of multilingualism, in fact, have recently come to the forefront of public policy debates. Political reality shows that linguistic issues and, in particular, the treatment of minority languages are almost unparalleled in terms of their explosiveness and emotional appeal, much more than any other question of resource allocation or responsibility sharing within a polity. In fact, multilingualism or linguistic diversity in a heterogeneous society provide extraordinary challenges and room for policies which may have important economic implications in shaping the flows of interregional or international trade, investment and migrations. Multilingualism or linguistic diversity in a society is an important phenomenon that can generate gains or losses resulting from the economic interactions between individuals, regions or countries. (Ginsburgh and Weber, 2006)

This paper will focus on the study of linguistic diversity in the linguistic landscape from an interdisciplinary perspective: sociolinguistic and economic. The linguistic landscape is:

> 'The language of public road signs, advertising billboards, street names, place names, commercial shop signs, and public signs on government buildings combines to form the linguistic landscape of a given territory, region, or urban agglomeration. The linguistic landscape of a territory can serve two basic functions: an informational function and a symbolic function. (Landry and Bourhis, 1997: 25)'

2. Linguistic Landscape and Economic Analysis and Methodologies

There are many reasons why signs are important to economists[5]. First, signs convey information in order to solve the problems generated by asymmetric information. Since the seminal work by Akerlof (1970, a cornerstone of economic theory is that asymmetric information generates market failures. Market failures imply that the market does not clear at the competitive, shadow price equilibrium. This means that less consumers (with respect to the perfect competition structure) will buy the product (because they are not aware of the product's existence or characteristics) and less firms will offer the product. Therefore, prices will be higher than the competitive equilibrium and the traded quantity will be less. In addition, a sign can convey information about the product's quality and origin.

Second, signs help to minimise transaction costs[6]. Clearly, a sign can help to minimise ex ante transaction costs, by conveying useful information.

Third, signs "signal" important information about international brands, by providing mediation of reputation that cannot be maintained by direct familiarities.

Fourth, signs are an indirect form of advertising and are useful in order to attract customers. The shape, language, fonts type, information contained in a sign can attract customers, just like publicity.

Finally, the choice of a particular language in signs, in multilingual landscapes, reveals the agents' preference structure for that language and can be measured, by using valuation methods, for policy design.

There are a number of economic works in the field of multilingualism. A seminal paper is the work of Ginsburgh and Weber (2005), which consider a linguistically diversified society that has to select a set of languages to be used for official purposes. The authors examine the notion of *language*

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[5] For a survey of sign economics, see Ramello (2005).

[6] Williamson (1985) defines transaction costs as those costs associated with the problem of contracting. There are two types of transaction costs:
- Ex ante costs: "costs of drafting, negotiating, and safeguarding an agreement".
- Ex post costs: "maladaptation costs"; costs of renegotiating contracts in response to misalignments; set-up and operating costs of governance structures for dispute resolution; costs of effective secure commitment.

disenfranchisement that is created when one or more languages fail to be included in the list of the official ones, implying that some individuals are denied full access to documents and to the political process in their native tongues. To derive one of the disenfranchisement indices, the authors use the Dyen *percentage cognate* matrix of linguistic distances between languages. Then they apply survey and population data on language proficiency in the European Union, calculate disenfranchisement indices and determine optimal sets of official languages that depend on two main parameters: society's sensitivity to disenfranchisement and comprehensiveness of the language regime adopted. The main results show that it could be unwise to select English alone as a working language, not only because it is not always optimal, but also because it is optimal only for very small values of the coefficient which represents sensitivity to disenfranchisement. What is remarkable, however, is that whatever index is chosen, the best choice of three languages is English, French and German, though Italian could be a very reasonable substitute for French. It may therefore be reasonable for the European Union to adopt four working languages, three of which (English, French and German) for general use, while Spanish is added for its importance in the rest of the world.

The specific aim of this paper is to perform an econometric analysis of different linguistic landscapes, by focusing on the main shopping streets in Donostia and Ljouwert so as to contribute to the study of linguistic diversity and sustainability from a multidisciplinary (economic and linguistic) approach. The study is important to suggest targeted linguistic and economic policies.

To our knowledge, this is the first economic work in this field. Our multidisciplinary study adopts the economists' empirical research methods (econometric analysis) in order to investigate whether and how different commercial, economic and linguistic characteristics, indicated in the signs of the main shopping streets, affect the choice of the language used. Therefore, our study represents a primer in order to test the econometrics of multilingual signs and understand what is in a sign.

3. Linguistic diversity

Linguistic diversity has been broadly defined as the 'range of variations exhibited by human languages´ (www.terralingua.org). It is difficult to estimate the total number of languages used in the world today. The Ethnologue (Gordon, 2005, www.ethnologue.com) considers that there are 6,912 languages, but some of the languages included are just considered varieties or dialects in other accounts. Some languages are strong and are spoken by millions of people while others are at risk of extinction. Forty per cent of the world's population uses one of the most common eight languages as a first language. These languages are Mandarin, Hindi, Spanish, English, Bengali, Portuguese, Arabic and Russian. In contrast, most languages (> 4,000) are spoken by less than 2% of the world's population and some of these only by a few hundred people. The Ethnologue classifies 516 languages as nearly extinct because they are spoken by just a few elderly people.

The number of languages is obviously higher than the number of countries in the world, so several languages are spoken in the same country and many speakers are multilingual. In fact, hardly any country can be considered monolingual in the world today. Multilingualism can be the result of different factors:

- Historical or political movements such as imperialism or colonialism. In this case the spread of some languages, such as Spanish in Latin America or English in India.

- Economic movements in the case of migration. The weak economies of some areas and countries encourage the population to move to other countries, thus fostering the development of multilingual and multicultural communities in the host countries.

- Increasing communication worldwide and the need to be competent in languages of wider communication. This is the case with the development of new technologies and science. English is the main language of wider communication, but it is used by millions of people who use other languages as well.

- Social and cultural identity and the interest for maintenance and revival of minority languages. This interest creates situations in which two or more languages co-exist and are necessary in everyday communication.

- Multilingualism can be the result of education, as second and foreign languages are part of the education curricula in many countries.

- Religion movements that result in people moving to a new country

English is the most important language of wider communication in the world as the result of British colonial power in the nineteenth century and the first decades of the twentieth century, and the leadership of the US in the twentieth century. English is the main language of science and technology in the world, and it is spreading to many countries and regions where English was not traditionally spoken. English is the main language of popular culture and globalisation, as can be seen in advertising. Nowadays multilingualism usually implies English and other languages. English has also been considered a threat for linguistic diversity (Phillipson, 1992).

The death of a language is a significant loss, because it implies a loss of inherited knowledge. Cultures are transmitted through languages, and languages also reflect the history of the people who have used them. Linguistic diversity is not less important than ecological diversity (Krauss, 1992). Krauss (1992,

1995) estimates that 50% of languages could die in the next 100 years and that in the long term 90% of the world languages could die. Is it important to maintain the largest possible number of languages? Crystal (2000) gives five reasons to justify the importance of language diversity:

i. Ecological diversity.

ii. Languages express identity

iii. Languages are repositories of history

iv. Languages contribute to the sum of human knowledge

v. Languages are interesting in themselves.

When we look at these reasons we can see that languages can contribute to human welfare, social cohesion or integration. Linguistic diversity is not only part of cultural diversity but it can be its basis. A language is a crucial part of the heritage of a specific community. It shapes and builds its identity in a similar way as its physical heritage does. Therefore. its existence needs to be valued and preserved as we do with the cultural and environmental heritage of a region. In other terms, many of the considerations that one can make for cultural heritage goods seem to hold true for languages. Taking into account the importance of linguistic diversity, the next step is to try to preserve it. In order to do so it is necessary to develop specific policies to try to avoid the decline of weak languages. This is known as language planning. Language planning refers to 'deliberate efforts to influence the behavior of others with respect to acquisition, structure or functional allocation of their language codes' (Cooper 1989: 45).

4. The Basque Country and Friesland

The data for the study of the linguistic landscape reported in this paper have been collected in the Basque Country and Friesland. Both regions have an autochtonous language, Basque and Frisian, which are considered minority languages.

The Basque Country extends over an area of approximately 20,700 km2 in the North of Spain and the South of France at the Atlantic border. It covers the Basque Autonomous Community, the region of Navarre and Iparralde. The total Basque population is approximately three million, 91% being Spanish citizens. The percentage of bilinguals (Basque-Spanish or Basque-French) for the whole of the Basque Country is 22%, and 14.5% is passive bilingual (only comprehension skills in Basque and limited production). The number of bilinguals (Basque-Spanish) in the city of Donostia-San Sebastian is higher, 33% of the population. San Sebastian has approximately 180,000 inhabitants. Basque and Spanish are official languages in the Basque Autonomous Community since 1979. The Basque Government has a strong policy to promote the teaching and use of Basque This policy has had some effect in restoring the status of Basque, but Basque is still a language at risk and only 11.9% of the population uses it more than Spanish (Euskararen Jarraipena III, 2003).

Friesland is one of the twelve provinces of the Netherlands. The province is located in the northwest. Its territory has a surface of 3,360 km^2. Friesland has a population of 643,000 (2004), which is equal to 190 inhabitants per km^2. The capital is Ljouwert (Fr. Ljouwert), which has some 91,000 inhabitants. Approximately 94% of the population can understand Frisian, 74% can speak Frisian, 65% can read it and 17% can write the language (Gorter and Jonkman 1995). Over a period of more than 25 years there has been a small decline in speaking proficiency and some improvement in writing abilities. There is, however, an ongoing language shift among the younger generations towards Dutch as a first language. Frisian is relatively strong in the domains of the family, work and village community, but Dutch dominates in the more formal domains of education, media, public administration and law (Gorter,

Riemersma and Ytsma 2001). The Frisian language has been officially recognised as the second language of the Netherlands and there is general political agreement that it is the government's duty to protect and promote Frisian. However, the policy plans have a non-committal character and they have hardly been implemented (Gorter 2001).

The increasing spread of English in Europe can also be seen both in Friesland and in the Basque Country. In both regions English is becoming part of the linguistic landscape. It is taught at schools in Friesland from the end of primary school (10-year olds), whereas in the Basque Country, English is taught in most schools from the age of four. There are important differences between the Netherlands and Spain regarding the knowledge of English. According to the Eurobarometer (2005), in the Netherlands 91% of the population can speak at least one other language apart from their mother tongue and this percentage is only 36% in Spain. This foreign language is in many cases English. The self-assessed ability in English is rather high in the Netherlands, where over 52% of the population rates its knowledge of English as "very good", but much lower in Spain, where only 23% of the population is in the "very good" category (Eurobarometer 2001).

In commercial signs English is not so much useful for the factual information it transmits, as for its connotation value. As Piller (2001, 2003) points out the audience can recognise that the message is in English and this activates values such as international orientation, future orientation, success, sophistication or fun orientation.

5. The dataset

The dataset contains information about the linguistic landscape in Ljouwert (Ljouwert) and San Sebastian (Donostia). In particular, observations were collected in the cities' main shopping streets, in order to allow for a certain degree of comparability. The dataset for Ljouwert contains 103 observations (language signs) and related characteristics (typo of sign, language on the sign and so on); the dataset for San Sebastian contains 104 observations (language signs) and related characteristics.

The corpus of this study includes a complete inventory of the linguistic landscape of just one street in the Basque Country and one street in Friesland. The streets selected were main shopping streets and both had a length of approximately 600 meters. A total of 975 digital pictures of street signs were taken and 207 units were distinguished: 104 in Donostia and 103 in Ljouwert. Each establishment but not each sign was considered the unit of analysis (see Cenoz & Gorter 2006). The collected signs convey information about different characteristics of the sign as shown in Table 1[7].

** Insert Table 1 here**

6. Descriptive Statistics

In order to highlight some economic relations among the variables, we start by calculating the distributions of some selected variables.

Such a non parametric exercise has a twofold importance. First, it allows to understand the variables' relationships. Second, it is preliminary to the definition of the proper parametric exercise and related empirical specification selection.

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[7] Remark: Variables 1-6 report important information to economic studies; whilst variables 7-14 are more important to linguists.

Tables 2 and 3 report the non parametric distribution for the variables "language on the sign" (Lansign) and "branch[8]", respectively, for Donostia and Ljouwert.

** Insert Tables 2 and 3 here**

We can see that the highest percentage corresponds to the majority language, Spanish (36.5%), but that Basque and Spanish are also common in street signs (22.11%). When we look at the use of Basque we can see that either on its own or with other languages Basque is used in 50% of the signs. English is the most common foreign language, and it is used on its own or in combination with other languages in 27% of the signs.

Almost two-thirds of the signs (64%) in Ljouwert are written in only one language, but 36% in two languages and 8% in three or more. So, in Ljouwert most of the signs are monolingual.

For the minority language we observe a substantial difference between Frisian and Basque. Frisian appears on its own in only 3% of cases, it is present in a small number of Frisian/Dutch bilingual signs and it is completely absent in multilingual signs. The minimal presence of Frisian as a written language on the signs reflects the overall modest importance of this language in the written form in society in general. Frisian is predominantly a spoken language (over half the population can speak Frisian), while the number of documents, forms, books, journals, etc in Frisian is rather minimal when compared to Dutch (Gorter 2001).

On the contrary, Basque has a stronger presence in monolingual signs with about one in every eight signs (12%). When we consider all the signs where the Basque language is involved, the total comprises half of all the signs (12% monolingual, + 22% bilingual Basque-Spanish + 2% Basque-

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[8] Branch = street sign; shop; garage; bar/restaurant; school; bank/ATM; poster; health care; commercial sign; hairdresser; repair shop; other; official building; street sign; poster; estate agent; cinema; hotel.

English + 10% Basque-Spanish-English + a few of the other combinations also involve Basque: amounting to over 50%). We know that Basque is spoken by about one third of the population, but as a written language its importance is clearly shown in the linguistic landscape. The acceptance of Basque as a written language is high in all sectors of society. Here, Ljouwert (Friesland) and Donostia (Basque Country) differ to a large degree.

When we turn to the socially dominant language in each case, that is Dutch in Ljouwert and Spanish in Donostia, we also see some differences, but they do not seem as important. In Ljouwert Dutch is present in 91% of all signs, either monolingual Dutch in over half of the signs (53%) or bilingual or multilingual signs (31% + 2% + 5%). Dutch is not present in 9% of the signs (3% Frisian, 6% English). Therefore, Dutch is obviously the dominant language in the linguistic landscape of Ljouwert. Spanish is the most common language in Donostia with over one third of all signs in Spanish only (36%). If we add to this figure the bilingual and trilingual signs involving Spanish, we see that Spanish can be found in 82% of the signs and in this sense Spanish dominates the linguistic landscape (22%+6%+10%+8%).

As far as English is concerned, the difference between Ljouwert and Donostia in monolingual signs is small, i.e. 6% and 4%, respectively (see picture C for a monolingual English sign in Ljouwert). However, when we add all the signs that include English, then we see that English is present in 37% of all signs in Ljouwert (6%+31%) and only in 28% of all signs in Donostia (4%+6%+2%+ 10%+6% of the combinations). Other foreign languages have a very limited presence with some signs including some words in French or German.

7. Estimation Results

Our research continues by attempting to answer the following question: how do different characteristics (type of shop, branch, chain and so on) affect the choice of the language used in the sign?

In order to address the research question, we consider only the population of signs with a selected minority (international, official or combination of language(s). In this way, we can refine the analysis by using a sample of selected languages and check whether and how the different economic and informative characteristics affect the choice of the language for the sign. In this case, the OLS estimation method would not be efficient, because the sampling process might imply that the variance of the error term is not constant, but dependent upon the explanatory variables. To solve this problem, we can specify the likelihood function of the sample[9] and then estimate the obtained logit and probit models by maximum likelihood.

Preliminary to this, dummy variables have to be created. Dummy variables are variables that mark or encode a particular attribute, taking the value of 1 when the attribute is present in the regression and zero otherwise.

After several checks, we estimate the following probit empirical specification:

(1) $\text{Prob}|\ LanguageType_{i,k} = \beta_0 + \beta_j\ characterisitcs_i + \varepsilon_{i,k,j}$

where, the dependent variable *LanguageType* represents the *k-th* type of language (minority, official, international or a combination of them) for sign *i*; β_0 is the costant; β_j are estimators for the *j-th* considered characteristics contained in the *i-th* sign and $\varepsilon_{i,k,j}$ is the error term.

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[9] It is a common choice to opt for the standard normal distribution function leading to the probit model , and the standard logistic distribution function, which results in the logit model.

Table 4 reports selected probit results for San Sebastian and Table 5 reports selected probit results for Ljouwert[10].

It is important to point out that the analysis is performed in a very similar way for both cities, with the exception of the analysis of bilingual signs. Following the linguists' expertise, we select Spanish (national language) and Basque (minority language) for Donostia, and Dutch (national language) and English (international language) for Ljouwert. The choice of such asymmetrical analysis of bilingual signs is due to the different cultural and linguistic backgrounds. Basque and Spanish, in fact, are used in a dichotomous way because Basque is linguistically very different from Spanish; it has to be formally studied and it is used in contexts others than those where Spanish is normally spoken. There are intensive local governmental policies to create incentives[11] to use and speak Basque. Frisian is more spontaneous (oral tradition, no governmental incentives to study the minority language) and similar to Dutch. In addition, English is highly spread and spoken in The Netherlands. For this reason, we decided to consider different combinations of languages in the analysis of the bilingual signs, for the selected cities. The same reasoning holds for the selection of the multilingual signs' dependent variables in the two selected cities.

** Insert Table 4 here**

From the analysis of the results, we can highlight several points. First, some methodological remarks. The linguistic variables are never statistically significant in the analysis carried out, where the dependent variable is a single language (Dutch, English or Frisian). However, some linguistic variables

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[10] The computations were performed with STATA.
[11] These incentives are both monetary (like investment support to businesses who use commercial signs in Basque) and regulatory (like the public provision of the linguistic landscape). .

become statistically significant when a combination of languages is considered. The pseudo R^2 indicators are rather acceptable for all estimation results, since for this kind of studies, pseudo R^2 (indicating the suitability of the model) are rather low. This might imply that the selected empirical model and estimation techniques have a good capability to test the relationships considered, given the dataset constraints (small dataset). Second, the probability that the language on the sign is English is (obviously) positively affected by the international chain and national chain variables, and negatively affected by the shop variable. Third, the probability that the language on a sign is Basque is positively affected by the street sign variable and negatively affected by the shop, other and bars and restaurants variables. Fourth, the probability that the language on a sign is Spanish is positively affected by the poster and independent chain variable and negatively affected by the bars and restaurants variable. Fifth, the probability that the languages on the sign are both Spanish and Basque is positively affected by the national chain, shop, ATM, bars and restaurant and street sign variables and negatively affected by the independent chain variable. The probability of a bilingual sign is determined by linguistic variables: if the selected languages have the same size and convey the same information, then the sign is bilingual (Spanish and Basque). Finally, the probability of a sign in a combination of Basque and other languages (German, Italian, Japanese, French…) is positively affected by the commercial sign, bars and restaurants, fashion shop variables, and negatively affected by the fact that the majority language (Spanish) has a bigger size on the sign.

** Insert Table 5 here**

Also in this case, we can highlight several points. The same technical remarks, used for the Donostia estimations, hold. First, the probability that the language on the sign is English is positively affected by the international chain; national chain, and shop variables, and negatively affected by the street sign

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variable. Second, the probability that the language on a sign is Frisian is positively affected by the shop and official building variables. Third, the probability that the language on a sign is Dutch is positively affected by the street sign, regional chain; national chain; furniture shop; jewellery variables, and negatively affected by the fashion shop variable. Fourth, the probability that the languages on the sign are both English and Dutch is positively affected by the independent chain, national chain and fashion shop variables, and negatively affected by the regional chain and bars and restaurants variables. Linguistic variables affect the probability that the sign has a certain linguistic content: if the size of the foreign language is bigger, then the adopted sign is bilingual (Dutch and English). Finally, the probability that the language on the sign is another language (local dialect, invented language) or a combination of Dutch and other languages is positively affected by the independent chains, bars and restaurants, fashion shop, jewellery shop, poster, and same font variables, and negatively affected by the variable that signals that the foreign language has a bigger size in the sign.

8. Conclusions

In this work, we have performed an econometric analysis in order to investigate whether and how the different commercial, economic and linguistic characteristics of the signs of the main shopping streets, affect the choice of the language used for the sign. We have worked with a dataset containing about 200 observations collected in the main shopping streets in Donostia and Ljouwert and analysed the dataset by regressing a probit model with the maximum likelihood estimation method. The main results are different for the two selected, minority language cities. In particular, for Donostia, the probability that the language on the sign is English is (obviously) positively affected by the international chain and national chain variables, and negatively affected by the shop variable. Third, the probability that the language on a sign is Basque is positively affected by the street sign variable and negatively affected by

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the shop, other and bars and restaurants variables. The probability that the language on a sign is Spanish is positively affected by the poster and independent chain variable and negatively affected by the bars and restaurants variable. The probability that the languages on the sign are both Spanish and Basque is positively affected by the national chain, shop, ATM, bars and restaurant and street sign variables, and negatively affected by the independent chain variable. Linguistic variables affect the probability that the sign is bilingual: if the selected languages have the same size and convey the same information, then the adopted sign is bilingual (Spanish and Basque). Finally, the probability that the language on the sign is a combination of Basque and other languages (German, Italian, Japanese, French…) is positively affected by the commercial sign, bars and restaurants, fashion shop variables, and negatively affected by the fact that the majority language (Spanish) has a bigger size on the sign.

For Ljouwert, the probability that the language on the sign is English is positively affected by the international chain; national chain, and shop variables, and negatively affected by the street sign variable. The probability that the language on a sign is Frisian is positively affected by the shop and official building variables. The probability that the language on a sign is Dutch is positively affected by the street sign, regional chain; national chain; furniture shop; jewellery variables, and negatively affected by the fashion shop variable. The probability that the languages on the sign are both English and Dutch is positively affected by the independent chain, national chain and fashion shop variables, and negatively affected by the regional chain and bars and restaurants variables. Linguistic variables affect the linguistic content of a sign (probability that the sign has a certain linguistic content): if the size of the foreign language is bigger, then the adopted sign is bilingual (Dutch and English). Finally, the probability that the language on the sign is another language (local dialect, invented language) or a combination of Dutch and other languages is positively affected by the independent chains, bars and restaurants, fashion shop, jewellery shop, poster, and same font variables,and negatively affected by the variable that signals that the foreign language has a bigger size in the sign. Table 6 summarises the

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main econometric results. An in-depth, (economic and linguistic) analysis of the obtained estimates is not the objective of the present paper and will represent the subject for further research. However, some preliminary points can be highlighted. Following Piller, in commercial signs English is not so much useful for the factual information it transmits, as for its connotation value. The audience can recognize that the message is in English and this activates values such as international orientation, future orientation, success, sophistication or fun orientation. This is particularly evident in the Netherlands and Ljouwert, where English is widespread and broadly used for commercial purposes, but not in Donostia (the estimated coefficient for shops presents a negative sign).

** Insert Table 6 here**

In Donostia, most commercial activities and street signs are bilingual (Basque and Spanish), whilst in Ljouwert, Frisian is used to indicate official buildings and some shops, and its use is less common. Frisian is a spontaneous language phenomenon. In our interpretation, Basque and Spanish have to be considered as complementary goods, with a positive crossed elasticity of demand. On the contrary, Frisian and Dutch are (imperfect) substitutes (since some words overlap), with a negative crossed elasticity of demand. Alternatively, Basque and Spanish can be interpreted as two different markets offering different products, whilst Dutch and Frisian can be interpreted as differentiated products produced in the same market. Finally, the linguistic and economic motivations of the findings are beyond the objectives of this paper. However, in the stream of other economic works on multilingualism, the results corroborate the important assumption that multilingualism and the choice of the language (even in a street sign) is both an individual and a social preference. Understanding individuals' linguistic preference structures is preliminary to the target and design of proper linguistic and social policies.

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Table 1. Selected Variables[12]

Number	Variable	Description
1	Type	type of the sign
2	Branch	Branch indicated by the sign (e.g. street sign, shop, garage, bar/restaurant; school; bank/ATM; poster: health care; commercial sign; hairdresser; repair shop; official building; estate agent; cinema; hotel; other.
3	Type of shop	Sign type of shop (e.g. Clothing; books; food; electronics; furniture, jewellery; perfume; optician; flower; music; suitcases: lottery, other)
4	Chain or Independent	Independent: regional chain; national chain; international chain
5	Number of languages of the sign	Whether the sign contains one or more languages
6	Language of the sign (Lansign)	Whether the sign is written in the official (national), minority languages; international languages, a mix of them or in invented languages.
7	First, second and third language on the sign	Whether the (respectively) first, second or third language on the sign is the minority, national, international language or a mix of them.
8	Size	Size on multilingual sign
9	Fonts	Type of font
10	Information	Type of information conveyed in different languages
11	Translation	Type of translation (e.g. word to word, free, no translation, and so on)
12	Function	Function of the text (informative; symbolic or both)
13	Grammar	Grammar use and correctness
14	Lexis	Lexis correctness
Number of Observations: San Sebastian (Donostia): 104 Ljouwert (Ljouwert): 103		

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[12] See in the Appendix the detailed list of variables.

Table 2. Non parametric distribution Branch vs. Lansign (Donostia)

Language on the sign		Branch
Basque	Observations	13
	Percentage	12.5%
Spanish	Observations	38
	Percentage	36.5%
English	Observations	4
	Percentage	3.8%
Basque, Spanish	Observations	23
	Percentage	22.11%
Basque, English	Observations	2
	Percentage	1.9%
Spanish, English	Observations	6
	Percentage	5.7%
Basque, Spanish English	Observations	10
	Percentage	9.6%
Basque, Spanish, German	Observations	1
	Percentage	0.9%
Basque, Spanish, English, French	Observations	4
	Percentage	3.8%
Basque, Spanish, English, Japanese	Observations	1
	Percentage	0.9%
Basque, Spanish, English, French, German, Italian	Observations	1
	Percentage	0.9%
Spanish, French	Observations	1
	Percentage	0.9%
Total Observations = 104		

Table 3. Non parametric distribution Branch vs. Lansign (Ljouwert)

Language on the sign		Branch
Frisian	Observations	3
	Percentage	2.9%
Dutch	Observations	55
	Percentage	53.3%
English	Observations	6
	Percentage	5.8%
Frisian, Dutch	Observations	2
	Percentage	1.9%
Dutch, English	Observations	32
	Percentage	31.06%
French	Observations	1
	Percentage	0.9%
Invented Language	Observations	1
	Percentage	0.9%
Invented Language, Dutch	Observations	1
	Percentage	0.9%
Local Dialect	Observations	1
	Percentage	0.9%
Dutch, French	Observations	1
	Percentage	0.9%
Total Observations = 103		

Table 4. Probit Estimations Results for the Minority Linguistic City of Donostia

Dependent Variable Independent Variables	ENGLISH (PROBIT ESTIMATE).	BASQUE (PROBIT ESTIMATE)	SPANISH (PROBIT ESTIMATE)	SPANISH + BASQUE (PROBIT ESTIMATE)	BASQUE + OTHER LANGUAGES (PROBIT ESTIMATE)
NATIONAL CHAIN	1.316 (0.04)	-	-	0.98 (0.15)	-
INDEPENDENT CHAIN	-	-	0.32 (0.25)	-0.18 (0.70)	-
INTERNATIONAL CHAIN	1.16 (0.15)	-	-	-	-
SHOP	-0.25 (0.09)	-1.47 (0.01)	-	0.68 (0.17)	-
ATM	-	-	-	0.76 (0.47)	-
COMMERCIAL SIGNS	-	-	-	-	0.063 (0.06)
FASHION SHOP	-	-	-	-	1.08 (0.05)
OTHER	-	-0.53 (0.37)	-	-	-
POSTER	-	-	1.61 (0.006)	-	-
BARS AND RESTAURANTS	-	-1.10 (0.09)-	-0.64 (0.319)	1.45 (0.01)	1.47 (0.08)
STREET SIGN	-	0.17 (0.74)	-	0.34 (0.00)	-
SAME SIZE	-	-	-	1.62 (0.01)	-
SAME INFORMATION				0.48 (0.48)	-
SIZE: MAJORITY LANGUAGE BIGGER	-	-	-	-	-0.55 (0.00)
CONSTANT	-1.78 (0.00)	-0.43 (0.31)	-0.60 (0.00)	-1.56 (0.00)	-0.67 (0.391)
PSEUDO R^2	0.16	0.19	0.10	0.32	0.12
LOG-LIKELIHOOD	-17.294	-29.51	-59.091	-36.09	-14.7

P-VALUES IN PARENTHESES

Table 5. Probit Estimations Results for the Minority Linguistic City of Ljouwert

Dependent Variable / Independent Variables	ENGLISH (PROBIT ESTIMATE)	FRISIAN (PROBIT ESTIMATE)	DUTCH (PROBIT ESTIMATE)	DUTCH + ENGLISH (PROBIT ESTIMATE)	DUTCH + OTHER LANGUAGES (PROBIT ESTIMATES)
INDEPENDENT CHAIN	-	-	-	0.94 (0.02)	0.18 (0.87)
REGIONAL CHAIN	-	-	2.49 (0.03)	-0.49 (0.61)	-
NATIONAL CHAIN	1.71 (0.02)	-	0.89 (0.03)	0.60 (0.34)	-
INTERNATIONAL CHAIN	1.77 (0.08)	-	-	-	-
BARS AND RESTAURANTS	-	-	-	-0.39 (0.45)	0.90 (0.48)
FASHION SHOP	-	-	-1.10 (0.06)	0.06 (0.88)	1.19 (0.24)
FURNITURE SHOP	-	-	0.61 (0.47)	-	-
JEWELLERY SHOP	-	-	1.16 (0.03)	-	1.51 (0.26)
SHOP (AS A BRANCH)	5.90 (0.00)	2.14 (0.04)	-	-	-
OFFICIAL BUILDING	-	2.83 (0.06)	-	-	-
STREET SIGN	- 6.12 (0.00)	-	1.85 (0.00)	-	-
POSTER	-	-	-	-	0.94 (0.24)
SIZE: FOREIGN LANGUAGE BIGGER	-	-	-	2.44 (0.00)	-0.04 (0.95)
SAME FONT	-	-	-	-	0.07 (0.90)
CONSTANT	-7.79 (0.01)	-3.93 (0.00)	-0.66 (0.82)	-1.33 (0.00)	-2.39 (0.00)
PSEUDO R^2	0.25	0.16	0.17	0.33	0.15
LOG-LIKELIHOOD	-15.37	-10.06	-59.05	-39.84	-17.29

P-VALUES IN PARENTHESES

Table 6. Summary

	English (NL)	English (S)	Dutch	Spanish	Frisian	Basque	Dutch English	Spanish Basque	Dutch + Others (NL)	Basque + Others (S)
Variables positively affecting the probability that the sign is in the language	International chain; national chain; shop	International chain; national chain	Street sign; national chain regional chain; furniture shop; jewellery shop	Poster; Independent chain	Shop; official building	Street sign	Independent chain; national chain; fashion shops; size foreign language bigger	National chain; Shop; ATM,; Bars, restaurant; street sign; language same size in the sign; same information	Independent chain; bars restaurant, fashion shops, jewellery shop, poster same font	Commercial sign, fashion shop; bars; restaurants
Variables negatively affecting the probability that the sign is in the language	Street sign	Shop	National chain; fashion shop	Bars; restaurants	-	Shops; other ; bars; restaurants	Regional chain; bars restaurant	Independent chain	Size of the foreign language bigger	Size of the majority language bigger