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Evaluating Language Policy and Planning: An Introduction to the Economic Approach*

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Abstract

This paper focuses on the contributions of economists to the selection, design and evaluation of language policies, particularly since the late 1970's. Therefore, it is not a survey of language economics, nor is it a discussion of the epistemological challenges that arise when applying the tools of mainstream economics to language issues. It shows how to perform status analysis using existing data on earnings, language skills, language of work and language of consumption. We explain how to carry out an evaluation of language policies using existing data. Finally, we provide an example of the use of stylized facts, an approach common in economic theoretical modeling and empirical evaluation.

Keywords: Language economics, language policy and planning, evaluation of language policies.

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1. Introduction

This chapter focuses on the contributions of economists to the selection, design and evaluation of language policies, particularly since the late 1970s. Therefore, it is not a survey of language economics, nor is it a discussion of the epistemological challenges that arise when applying the tools of mainstream economics to language issues. Readers interested in a more conceptual introduction to the economics of language and language planning are invited to turn to other contributions by Vaillancourt (1983), Grin (2003, 2012) or Grin & Vaillancourt (2012)

Language economics can be used in the study very different language policy problems, including the effective and cost-effective protection and promotion of minority languages, the teaching of national languages and/or languages of wider communication in education systems, the choice of language regimes for international or supra-national organizations, and the integration of immigrants, to name but some of the main areas of application. For lack of space, however, we shall avoid a sequential presentation of these applications and instead organize existing research in two main groups: one strand of work examines the *status* of different languages in multilingual settings, in order to provide background information to guide or justify public policies, while the other strand examines the *costs and benefits* of specific or general policy measures. This breakdown is not the only possible one, but it is convenient for the purposes of this chapter and can be mapped onto other typologies available in the literature. We add to this a brief section on the use of stylized data.

This chapter is organized as follows. Section 2 shows how to perform status analysis using existing data on earnings, language skills, language of work and language of consumption. Section 3 turns to the evaluation of language policies using existing data. Finally, section 4 provides an example of the use of stylized facts, an approach common in economic theoretical modelling and empirical evaluation.

It is important to stress two points. First (and in connection with the fact that this chapter is not intended as an overview or a survey of language economics), we place an emphasis on introducing essential practical tools. For this purpose, we mainly draw on our own published or currently ongoing work, spanning almost forty years of research in language economics and language policy evaluation. Second, what matters here is not so much the actual figures presented (for example, on the rate of return to second-language skills or the actual costs of such and such a policy) as the explanation of how they are arrived at and what they exactly mean. One implication is that we have selected examples not because they constitute the most recent results on one question or another, but because they were best suited to explaining methodological points. For a more detailed discussion of methodological issues, see Grin and Vaillancourt (2015).

2. Explaining language status

We begin by presenting bivariate and multivariate estimates of the impact of language skills on the earnings of residents of Québec for 1970 and 2005—the earliest and latest years for which such results are available (in April 2015). This line of work is amongst the longest-established in language economics, yet it remains representative of numerous studies for Québec, Canada and the USA using census or large-scale survey data. We present results for

men, since the variation in returns to language skills is greater for men than for women and thus more interesting for illustrative purposes. Economists generally prefer to use earnings rather than occupation or indicators of socio-economic achievement as their measure of status.

TABLE 1 - GROSS AND NET YEARLY EARNINGS DIFFERENCES IN %, QUÉBEC, MEN, 1970 AND 2005, SEVEN SETS OF LANGUAGE SKILLS

YEAR →	MEN 1970	MEN 2005	MEN 1970	MEN 2005
Type of difference	Gross (mean)		Net (marginal)	
Language group ↓				
Unilingual Anglophones	59.	25.	10.1	-8.2
Bilingual Anglophones	74.	36.	17.0	ns
Unilingual Francophones (reference group)	-	-	-	-
Bilingual Francophones	43.4	34.0	12.6	4.8
Anglophone Allophones	25.8	-13	ns	-28.1
Francophone Allophones	5.7	-28	ns	-31.7
Bilingual Allophones	45.7	11.	6.0	-19.3

Source: Vaillancourt et al. *(2013). Gross columns table 5 page S36; net columns table 7 S38 Net effects are controlled for the education, experience and number of weeks worked of each individual*

Let us now briefly explain how to read this table. The gross figures present the mean earnings by group. They show some convergence in the differences between Anglophones and Francophones over the 1970-2005 period. The net impacts of language skills (that is, after controlling for other determinants of labor income) are different from the gross impacts both in value and sometimes in sign. The most striking case is that of unilingual Anglophones in 2005, where the *positive* 25% gross impact turns out to mean a *negative* net impact of -8%, that is, a drop of 33 percentage points. But one also finds that the premium for bilingualism is much smaller and sometimes non-existent when net rather than gross impacts are used.

Economists argue that gross differentials are not very useful in establishing the status of a language or changes in it since both the level of earnings differentials and differences in these differentials among linguistic profiles may not reflect returns to language skills, but actually capture the effect of other determinants of earnings. Differentials could indeed be explained by other traits, such as differences or changes in the level of education or work experience of the individuals who also happen to possess these language skills. This is why economists set greater store by the *net* impact of language skills, that is, the net earnings differentials, which can be computed using multivariate analysis. The methodology used to obtain them is in general as follows:

- Representative, Adequate and Detailed data (a set of characteristics we may summarize as “RAD”) must be secured for the variables of interest. They may be obtained from

public use samples from censuses (Canada, including Québec) or survey data (Québec, United States, Israel, Germany, Switzerland, Australia);

- more or less narrow samples are analysed, usually focusing on people in the usual working age range (20-65), and sometimes restricted to men only, as above;[1]

- ordinary least squares ("OLS") regressions are used to estimate the link between a dependent variable (usually, the natural logarithm of labor income) and a set of independent variables;

- the set of independent (or "explanatory") variables used as control variables typically includes age, education, experience and its square[2], and weeks worked (if the sample is not restricted to full-time workers or if no other adjustment has been made to convert part-time earnings into full-time equivalents). These equations, made popular by the work of the economist Jacob Mincer in the early 1970s, were initially developed to evaluate the rates of return to schooling. Additional controls such as marital status, region of residence, type of employment, etc., are also commonly used, depending on the availability of data;

- the key independent variables, however, are the respondents' linguistic attributes, including their first language (or mother tongue, or L1) and their second or foreign language skills. OLS regressions provide estimates of the coefficients expressing the contribution of each independent variable to the value of the dependent variable.[3]

One difficulty with public data sets often is the lack of detailed information on language skills. In the work reported in Table 1, a 0-1 definition of bilingualism is used ("not bilingual" or "bilingual"). This results in a loss of precision, as shown by the figures on Switzerland presented in Table 2. Assume that the 0-1 definition of bilinguals is 1 for those with excellent or good language skills and 0 otherwise. Then a bilingualism coefficient of the type presented in Table 1 would not capture some relevant effects, such as the fact that an improvement from "basic" to "good" skills yields little gain (5%) while an improvement from "good" to "excellent" yields more than twice the returns (12%) of the first improvement.

[1] The focus on men results from the fact that data on women are generally less reliable, particularly with respect to "work experience". The latter variable is often approximated by "age *minus* the number of years of education". The resulting term *EXP*, however, may be overestimated for women, who are more likely, for social and cultural reasons not discussed here, to have left the labor market temporarily in order to raise young children. The overestimation of the experience term may impact on the estimation of its effect on earnings, and if the overestimation is linked to language, it may bias the estimation of the net effect of language skills on earnings. Hence, unless precise data on women's personal work history (including interruptions) are available, estimates of the value of language skills for women may be less reliable than for men, and may in particular be underestimated. For this reason, much of this discussion focuses on the case of men.

[2] The squared term provides a better statistical fit by allowing the estimation to take account of the progressive obsolescence of skills over a person's career, which generates a concave earnings function.

[3] Let us symbolize the estimated coefficient for variable v_j by the Greek letter β_j, which by definition is equal to the first derivative of the logarithm of earnings with respect to v_j. However, logarithmic expressions are not always easy to intuit, which justifies transforming the estimated coefficient β_j into a more readily interpretable notion. It can be shown that the contribution of v_j to earnings can be expressed in percentage terms as $b=e^{\beta}-1$ (see e.g. Grin, 1999: 56), and the results presented in this chapter are expressed in percentages. However, this transformation only really matters if β is relatively large. If β is relatively small (for example if its value is below 0.1), β and b can be considered as roughly equivalent.

TABLE 2 - GROSS AND NET IMPACT OF ENGLISH LANGUAGE SKILLS ON MONTHLY EARNINGS, SWITZERLAND, MEN

	GROSS	NET
Excellent	50	31
Good	29	19
Basic	16	14
None	-	

Source: adapted from Grin (2001: 72), Tables 1 and 2[4]

Multivariate analysis serves to isolate the effect of different independent variables (such as education, experience, language skills) on a dependent variable (such as labor income). It is precisely for this purpose that it has been used in the context of language economics, and this line of research is probably the single most important one in the specialty in terms of the number of papers published. [5] Nevertheless, this method has other uses that may be of interest to readers of this chapter. We thus present work on the acquisition of language, on the use of language in the workplace, and on the use of language in consumption activities. These processes can be viewed as partial determinants of the status of a language.

2.1 The acquisition of language skills

Language skills may be acquired through a variety of channels whose importance varies depending on context. Consider first the acquisition of an entirely "foreign" language, as when an Anglophone high school student in Kansas whose family uses only English at home decides to study French or Japanese. In this case, schooling is presumably a major determinant of language learning, although it may be complemented by language stays in France or Japan. If, by contrast, we refer to a person with an immigrant background and who—reverting to our previous example—uses Turkish at home but German with friends, colleagues and most providers of the goods and services he usually buys, we are facing a rather different case, in which the family environment usually is a key determinant of the development of his competence in Turkish, while the neighbourhood context plays a bigger role in the development of his competence in German.

With a sufficiently large sample covering a broad range of languages (L1, which is assumed to be fluently known, and skills in other languages labelled L2, L3, etc.), it is possible, using OLS regression, to identify general trends regarding the relative importance of different conduits for language learning. We can, for example, highlight particularly relevant strategies, among native speakers of language *X*, for the learning of languages *Y* or *Z*. The same

[4] All the results on Switzerland presented in this chapter rest on a sample of 2,400 adult respondents, collected in 1994/95, reflecting the actual distribution of the resident population of working age by gender, age and language region. No similarly detailed sample has been collected in the country since then. The *N* may vary between the tables presented here depending on the net response rate to the questionnaire items used.

[5] At this time, the total number of scientific contributions in language economics as a whole may be estimated at some 350 publications (Grin, 2014).

approach also enables us to assess whether, for native speakers of *X* and *Y* learning *Z*, the same conduits matter equally or not.[6]

Table 3 below presents the ex-post rank-ordering of different channels of acquisition of foreign languages, which may be an L2 or and L3. The foreign language concerned may be French or English in German-speaking Switzerland, German or English in French-speaking Switzerland, and German, French or English in Italian-speaking Switzerland. Estimates have been made for a representative sample of adult respondents. This rank-ordering of channels of acquisition shows how declared language skills have been achieved. It reveals, among other things, that the French- and German-speaking communities rely on the teaching of the target language as a subject in the curriculum (variable SUBJ) for the learning of national languages more than they do for the learning of English (typically taught, at the time of data collection, as a second foreign language), and that English is acquired through other means, particularly among native speakers of German. Note that this does *not* mean that channels with a weak performance, such as evening classes and private tuition (variable EVG) are *necessarily* pointless; it simply means that for the acquisition of declared L2 skills, such classes have played a negligible role for the respondents in our representative sample.

[6] We are aware of the concern expressed by some scholars that "named" languages, being constructs, do not really exist. To us, however, it does not follow that "the concept of mother tongue should have no place in the sociolinguist's toolbox" (Blommaert and Rampton, 2011: 1). First, the reluctance to refer to, and work with the concept of "mother tongue" is usually based on the somewhat idiosyncratic interpretation of a small clutch of non-representative observations. Such observations may apply to very specific sub-segments of the population, but not generally, as shown by the fact that in large-scale surveys, (irrespective of whether the data is collected in oral or in written form), the overwhelming majority of respondents have no problem at all indicating their native language. This also applies when they are explicitly offered the choice to indicate more than one native language (which avoids them being cornered into having to indicate one), and to provide detailed information about the level and origins of their skills in the various languages concerned (which serves to flag, in a survey context, the complexity, and sometimes the ambiguity, of the very notion of language skills). We readily acknowledge the *contingent* nature of language and its constructed character, but sober observation strongly suggests that "languages" do exist, and that real users of languages know quite well what their native language is; on this point, see Edwards (2012) or May (2012).

TABLE 3 – RANK-ORDERING OF SECOND/FOREIGN LANGUAGE LEARNING CHANNELS SWITZERLAND, MEN AND WOMEN, 1995

L1	German speakers		French speakers		Italian speakers		
L2	French	English	German	English	German	French	English
↓ Ranking							
1	SUBJ	CST	YOUTH	YOUTH	SUBJ	LIV	LIV
2	LIV	LIV	SUBJ	LIV	LIV	SUBJ	STAYS
3	YOUTH	YOUTH	LIV	SUBJ	YOUTH	CST	CST
4	IMM	SUBJ	IMM	CST	IMM	STAYS	SUBJ
5	CST	STAYS	STAYS	EVG	-	-	-
6	EVG	-	CST	EVG	-	-	-
7	STAYS	-	-	-	-	-	-

Source: adapted from Grin (1999: 129). Respective contributions to declared L2 sills significant at the 1% level for all variables

Variable labels:

CHLD: having used the foreign language concerned at home during childhood and teen years

EVG: taking or having taken evening foreign-language classes or private tuition

IMM: having been enrolled in for a period of 6 months or more in a school where the foreign language is the medium of education for part or all of the curriculum (full or partial immersion)

LIV: having lived for a period of 6 months or more, after the age of 5, in a country of region where the target language is used

SELF: having engaged in self-study of the foreign language using books and audio-visual materials

SUBJ: having studied the foreign language as a subject

STAYS: having been through one or more language stays, each lasting three weeks or more, with the explicit goal to learn or improve foreign language skills in the language concerned

YOUTH: having regularly used the foreign language concerned at home during childhood and teen years

CST: constant (effect of other, unobserved variables)

2.2 The use of a language in the workplace

Table 4 reports on the use of English in the workplace in Switzerland. The analysis is based on a simple “use” vs “non-use” variable. Using these results allows us to illustrate the application of another statistical technique, namely, the odds ratio (note, however, that this question could also be addressed using OLS, as done in Vaillancourt *et al.* (1994).

The odds ratio are a standard indicator of the likelihood of an event happening (for example, the event "being bilingual"): it is the ratio between the likelihood of the event taking place (numerator) and the likelihood of the event not taking place (denominator). For example, in Table 4 below, the odds ratio for a senior civil servant working in French- or German-speaking Switzerland of using English at work is 3.068 (significant at the 1% level). This means that he/she is three times more likely to use English than not to use English in professional activities.

TABLE 4 - DETERMINANTS OF THE USE OF ENGLISH AT WORK
FRENCH- AND GERMAN-SPEAKING SWITZERLAND, 1994-1995, ODDS RATIOS

	FRENCH-SPEAKING SWITZERLAND	GERMAN-SPEAKING SWITZERLAND
Constant	0.084***	0.225***
Type of job[a]		
Professionals	6.684***	0.993
Entrepreneurs	8.164***	3.049
Crafts / small business	1.508	1.039
Farmers	1.302	0.306
Middle managers	7.069***	1.716**
Senior civil servants	6.115***	2.618*
Civil servants	3.068***	1.40
Unskilled and semi-skilled	0.149*	0.135**
Economic sector[b]		
Services	2.658***	1.496**
Other independent variables		
Mainly internationally-oriented	5.117***	4.537***
Proximity to language border	0.517**	0.802
Gender: male	0.793	1.331
N	637	767
Pseudo-R^2	0.358	0.194

Source: Grin, Sfreddo and Vaillancourt (2010), Table 5.4.
a: omitted category: employees.
b: omitted category: manufacturing.
c: at firm level, as opposed to 'mainly national' and 'mainly local' orientation.
, **, *: statistically significant at 10%, 5% and 1% levels respectively.*

The results in Table 4 indicate that the use of English at work is more closely associated with particular jobs in the French-speaking than in the German-speaking part of Switzerland. However, we can easily detect sensible association patterns between the reported use of English and the type of job performed. It is quite logical for the odds ratio to be higher for white-collar workers (e.g., "liberal professions") and for professionals who are more likely to be involved decision making (e.g. "owners/managers", or "senior civil servant" v. "civil servant"). In the same way, a "mainly international orientation" has a strong positive effect (in both language regions) on the likelihood of using English.

2.3 The choice of a language of consumption

Table 5 presents results regarding the choice of a language of consumption by Francophones residing in Québec in 1979.They were asked, in French, "what language in general do you prefer being served in…". The results indicate that individuals with better knowledge of English are less likely to prefer being served in French, but that there is still a preference for this amongst Francophones fluent in English.

The technique used here is known as a "probit regression", where the dependent variable, instead of being a continuous one taking a numerical value (such as earnings or the logarithm of earnings, as used in the OLS regressions underlying net results in tables 1 and 2), is a dichotomous (or binary) variable, such as the fact that an event occurs or not. In this case, the event is the fact that a respondent expresses a preference for being served in French. The figures in Table 5 show that even among Francophones with strong English language skills, 82.7% express a preference for being served in French rather than in English. However, we see that the likelihood of expressing this preference declines with language skills. Taking respondents with "nil" or "poor skills" as the reference point (with a quasi-certainty of expression a preference for being served in French), the probit regression tells us that having excellent English language skills reduces this likelihood by 24%.

TABLE 5 - PREFERENCE FOR BEING SERVED IN FRENCH, FRANCOPHONE CONSUMERS, QUÉBEC, 1979, GROSS DIFFERENCES AND NET IMPACTS (PROBIT), N=786

	Gross preference (%)	Net preference
English skills: nil or poor	99,7	1 (implicit)
English skills: good	92,5	-0,22
English skills: excellent	82,7	-0,24
All individuals	91,5	--
	--	Other variables are income, age education and sex

Source: Vaillancourt (1985), Table 1

3. Evaluating language policies

In this section of the chapter, we present some empirical results and analytical methods in an increasingly important research area within the economics of language, namely, the evaluation of language policies.

It is not possible for organisations to avoid explicit or *de facto* language policies, as at least one code must be used for communication. The question therefore is *which* language policy to choose among the possible alternatives. This raises the problem of choice and therefore of the evaluation of the advantages and drawbacks of alternative options. Economics and policy analysis provide several tools and methods to help decision makers in their choices.

Generally speaking, policy analysis is based on counterfactual analysis, that is, a comparison between at least two scenarios based on standard evaluation criteria such as "relevance", "effectiveness", "efficiency" (or, depending on the data available, "cost-effectiveness") and **"**fairness" (Grin 2003, Grin and Gazzola 2013, Gazzola 2014). Let us note that assessing fairness from a policy analysis perspective does not imply a particular moral judgement. Rather, it refers to the evaluation of the distributive effects of language policies, that is, clarifying who wins and who loses, and how the benefits and costs, both material and symbolic, of alternative language policies are shared among individuals or groups. Clearly, the output of the evaluation procedure can be used to feed the moral debate on fairness in language policy and planning. The study of fairness in language policies is sometimes referred to as "linguistic justice" (Peled *et al.* 2014, Van Parijs 2011). In this section, we present three examples of applications of the policy analysis approach to the evaluation of language policies.

3.1 The costs and benefits of the Official Languages Act (OLA) of Canada

Coche and Vaillancourt (2009) estimate the marginal costs and benefits of providing services as a result of the *OLA*. English being the majority, and hence default language in Canada, the cost of the OLA is generally understood as the cost of providing services in French. The implicit counterfactual, therefore, is a unilingual federal government with English as the sole official federal language. The methodologically key points are how to define the target group of the policy, how to measure costs and how to measure benefits.

Policy target group
There are two possible definitions of Francophones. One definition of Francophones encompasses individuals with either knowledge of French only, or with knowledge of both French and English but with French as their mother tongue. This first definition is based on the perspective of language preference or identification. A second definition of Francophones is the population with knowledge of French only; it is based on a notion of strict necessity.

The choice of a definition is not without political implications, since using the first yields, with respect to the provision of public services, a minimum cost difference between Anglophones and Francophones and a maximum benefit for Francophones; using the second yields a maximum cost difference and a minimum benefit for Francophones. Why is it so? Because as the number of Francophones increases, on one hand the value per francophone of a given total flow of services decreases (larger denominator) while on the other hand multiplying a given per-unit cost difference by a larger number of Francophones increases the difference in total costs.

Costs

The availability of cost information is, of course, highly country-dependent. In the case of Canada, which is used here as an example, such information can be found in official documents, mainly the *Public Accounts of Canada*, which records amounts actually spent, as distinct from amounts budgeted. For some items of expenditure such as interpreting and translation, the published figure can be used directly. For others, such as the cost of the French-language arm (Radio-Canada) of the public Canadian Broadcasting Corporation, we must establish the marginal cost of this body since in its absence the English arm would provide services in Québec in English.

The marginal cost also referred to as additional or supplementary of a specific service is established thanks to a three-step procedure as follows, under the assumption of constant marginal cost (assumed to be the average cost) of a supplementary unit of that service:

- Calculate the *cost per individual* for the Anglophones by dividing the total costs of offering the service to Anglophones by the Anglophone population of Canada: this yields a unit cost per Anglophone.
- Calculate the *notional total cost* of providing the service to Francophones at the unit cost of Anglophones. To do this, one multiplies the per- Anglophone unit cost by the number of Francophones in Canada; this yields a notional cost for all Francophones.
- Subtract this notional total cost from the total cost for services to Francophones; this yields the *supplementary cost* of the services in French provided to Francophones.

Finally, we must account for items that can be neither captured directly such as translation, nor measurable as a marginal cost, such as minority-language provision. These additional items of cost are often embedded in general departmental spending. This is the case, for example, of the additional costs of printing reports in two languages as opposed to just one, and the reduced productivity (time loss) that may occur if some department personnel undergo mandatory language training, the assumption being that if this training were optional, the civil servants concerned would chose not to enrol. There may also be some miscommunication errors and slowdowns resulting from the use of two languages as opposed to one; however, this would only occur in actual bilingual situations, and not in all working environments of the federal civil service.

How can one get a handle on these two unobservable costs? The approach used by Coche and Vaillancourt (2009) is a *top-down subtractive* one as opposed to the *bottom-up additive* one used for the direct and marginal costs. They establish the total federal budget, remove from it items unlikely to be affected by the OLA and obtain a remaining amount. For example, interest payments or pension payments do not have OLA-related costs. They conclude that professional and special services are the category where extra OLA spending is embedded and that this should be accounted for with a 5% share of those costs[7].

Benefits

The same authors also examine the benefits derived from the provision of services by the Canadian federal government in two official languages. This examination leads them to reject two measures sometimes used in the literature. These are:

[7] This 5% figure is derived from the work on the use of minority languages in education also presented in this chapter.

- estimates of the size of the language industry, which are inappropriate since the question is what the benefits are to society, not the resources spent to generate these benefits;[8]
- increases in the exports of goods and services (educational services or tourism for example) and thus GDP, employment and so on. This would be relevant only if the policy targeted areas linked to exports such as, for example, the training of individuals in a language used to gain or maintain access to foreign markets. Given the areas covered by the OLA, which include parliamentary debates, artistic creation, and criminal courts, this approach would not be relevant for Canada. Provincial higher education policies are the key determinants of export-related language skills.

The fundamental benefit of the OLA is that it allows Francophones to access the services of the federal government in French. What is the value of such benefits for Francophones? One could ask the beneficiaries how much they would be willing to pay for these services, but information about "willingness to pay" is not available, and collecting it is notoriously difficult[9]. Let us instead assume that federal government services are offered only in English. If this happened, presumably, there would be a reduction in the demand for some federal government services by unilingual and bilingual Francophones. But for many federal government services used by Francophones, either as individuals or employees or employers, such a drop in demand for federal services is not feasible. This would apply, for example, to residents' interaction with the Canada Revenue Agency, or when obtaining a passport. Therefore, one can imagine the three following ways to keep using these services:

- An informal supply of services in French by federal civil servants who speak French. They would for example help tax fillers or applicants for passports fill out the various forms. This would, however, take these civil servants away from their other duties and impose a cost on the federal government if service standards were maintained. since more time and thus more employees would be required mainly in French-speaking Québec;
- A supply of English knowledge by bilingual family or friends of unilingual Francophones. This would require expenditure in time by private bilingual francophone citizens.
- A supply of French by privately hired professional interpreters and translators. This would require monetary expenditure by private unilingual Francophone citizens.

What are the plausible costs of these three possible responses to an English unilingualism policy? This depends on the product of the multiplication of the following terms

- the number of users, which depends on the target population;
- the number of hours per user of interaction with the provider of the services;
- the unit costs of an hour of interaction with each type of provider;
- the mix of providers used.

In practice, from the point of view of a Francophone, avoiding such costs can be viewed as the main benefit of the OLA. Canada numbers 4 million unilingual Francophones, which we multiply by 10 hours times ((.33 × the wage of civil servants+ (.33 × implicit wage of friends and family) + (.33 × wage of interpreters and translators)) as detailed in Coche and Vaillancourt (2009).

[8] See Industry Canada, *Economic Assessment of the Canadian Language Industry*, [Online] Available at http://www.ic.gc.ca/epic/site/lain-inla.nsf/en/h_qs00196e.html

[9] There again, as suggested in footnote 3, the use of evaluation techniques imported from environmental economics may be particularly useful.

The target population could be increased by 3.3 million to account for bilingual Francophones. The total number of hours this entails for civil servants could, however, be reduced if one takes into account the fact that they would have interacted with the bilingual Francophones in English anyway.

The whole exercise yields the information found in Table 6.

TABLE 6 - SUMMARY OF RESULTS ON THE COSTS AND BENEFITS OF THE OFFICIAL LANGUAGES ACT, CANADA, 2006

Observable costs M$ (1)	1139
Induced costs M$ (2)	440
Total costs M$ (3)= (1)+(2)	1579
Benefits Strict necessity M$ (4)	640
Benefits preference for French M$ (5)	1170
Cost/ public (program) spending (6) %	1
Cost /GDP (7) %	0.15
Cost Francophone (MT) (8) $	230
Cost /Canadian (9) $	55

Source: Coche and Vaillancourt (2009; page numbers below refer to this publication).
(1): mean of the minimum and maximum totals, table 4 p. 29;
(2) text, p. 31; (4) and (5): text pp. 42-43;
(6), (7) and (9): text p 31;
(8) calculations using (9) and share of Francophones of 24%

3.2 Comparing policies across countries

The work reported above examines the impact of one language policy made up of several specific measures in one country. This is less complex than the work on which we now report, where different policies in different countries had to be compared.[10] The following issues had to be addressed:

Defining a relevant output: for this purpose, we use the amount of time a minority language would be used as a result of a policy outcome (one more hour of TV in a minority language for example) as the output measure;

Transforming stocks into flows: some policies such as providing road signs in a minority language put up a structure with a lifespan of several years. To compare this policy with the provision of minority language childcare services, one must assign an annual cost of services

[10] The policies considered all aimed at protecting or promoting a minority language (Irish, Welsh or Basque) (see Grin and Vaillancourt, 1999).

to the capital stock embedded in the road sign; otherwise, one would be comparing what is not comparable. This is given by the real rate of return on capital, plus the depreciation rate of capital. Thus, if the real rate of return on capital is 5% per annum and the depreciation rate also is 5% (assuming therefore that a sign lasts for 20 years and then needs to be restored or replaced) then a sign costing 1,000 to put up has an annual cost of 100.

Ranking policies: not all policies are equally effective in absolute and in relative terms. However, one must use explicit criteria to assess them. We use four impact criteria, along with the associated costs, which have been ranked from 1 to 10 with 1 assigned to the best outcome and 10 to the worst. The results are shown in Table 7. This is a *cardinal* ranking based on the judgment of the authors as argued in the study quoted here, and drawing on information provided by published sources and informants. The key point to understand here is that in the real world of language policy evaluation, one needs to have *some kind* of basis for comparing and choosing policies. Therefore, one is often led to use not just high-quality ("RAD") data subjected to elaborate statistical treatment, but also to combine them with cruder estimates of other dimensions of the questions at hand. This often proves unavoidable in practice, particularly when policy recommendations are expected. Thus, in this example, a policy with a high index value (say, 9) is less appropriate than one with low index value (say, 2). Table 7 shows the outcome of this exercise. Basque education is the best performing policy and Welsh road signs the least performing policy.

TABLE 7 - SUMMARY OF THE COSTS AND BENEFITS OF FOUR MINORITY LANGUAGE EUROPEAN LANGUAGE POLICIES, 1997

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Welsh road signs	1,98	Nil 10	Nil 10	Med. 4	Low 8	10	32	42
Welsh-medium TV	0,50	Med.-high 3	Med.-low 7	High 1	High 2	4	13	17
Basque Education	0,10	High 1	High 2	Med.-High 3	Prereq. 1	2	7	9
Irish private signs	0,02	Low 8	Nil 10	Med.-High 3	Low 8	1	29	30

Source: Adapted from Grin and Vaillancourt (1999), Table 23
(1): Cost per hour in Euros
(2): Average competence level of speakers
(3): Number of speakers
(4): Indicator of language attitudes
(5): Indicator of language use
(6): Cost index
(7): Impact index
(8): Impact + cost
Note: numbers in columns (2) to (5) are impact indexes and numbers in column (6) are cost indexes. Column (7) is the sum of the "impact" columns (2)-(5) and column (8) is the sum of columns (6) and (7).

3.3 Evaluating the language regimes of international organizations

International organisations can be viewed as part of the public sector. Just like any organisation operating in multilingual contexts, international organisations must adopt a set of norms and regulations to manage multilingual communication, both as regards their internal and external communication. This set of norms is usually called "language regime". Language regimes, therefore, are a particular form of language policy.

Language regimes influence the overall linguistic environment mainly through status planning. For example, granting a language the status of official language of the United Nations or of the European Union certainly increases the status of such a language. Language regimes occasionally also have an impact on the corpus of a language. This was the case for the official languages of several Eastern European countries as well as Greece when they became Member States of the EU. In several cases, it was necessary to elaborate new terms to translate and accommodate the *acquis communautaire* (that is, the body of EU norms) into the official languages of the new Member States. This is a form of corpus planning.

Translations and interpretation policies are an essential component of language regimes in multilingual organisations. The costs of translation and interpreting services (TIS) are referred to as the *primary costs* of a language regime. They are usually relatively visible and therefore easy to compute. Nevertheless, there is a second type of costs associated with language regimes called *implicit costs.* Implicit costs are a wide set of language-related costs arising when agents must interact with an organisation in a language that they do not master. This class of costs includes quantifiable costs such as learning time and effort, costs for learning (e.g. teachers and learning material), costs for privately supplied translations or interpreting, as well as the opportunity cost of resources used for language learning and translations. The concept of implicit cost includes non-quantifiable forms of losses experienced by some users, such as alienation and the erosion in the prestige of a language. Having the possibility to use a language in which one feels at ease (typically one's mother tongue or primary language of education) during interaction with a given organisation is tantamount to reducing the implicit costs borne by the speakers of this language. In the previous section, for example, one of benefits of the Official Languages Act (OLA) of Canada for native speakers of French was defined indeed in terms of (implicit) cost savings. The notion of implicit cost can be fruitfully applied to the analysis of the economic effects of language regimes at the international level. An interesting example is given by international organisations active in the promotion and protection of intellectual property (IP) rights, such as the World Intellectual Property Organisation (WIPO) or the European Patent Office (EPO). Let us briefly discuss them in turn.

The official languages of the EPO, a regional patent office based in Munich, are English, French and German. European patent applications can be lodged in other languages, but in this case a translation into one of the official languages of the Office must be provided within two months. If a patent is eventually granted, all applicants must translate claims into the other two official languages of the EPO. The official languages of contracting states are named "admissible non-EPO languages" if the official languages concerned are not English, French or German. Natural or legal persons having their residence or principal place of business within a contracting state having a language other than English, French or German as an official language, and nationals of that State who are resident abroad, are entitled to a reduction in different fees if they choose to file a European patent application in an admissible

non-EPO language. The current reduction in different fees is 30%, but this compensation scheme is applied only to small and medium-sized enterprises, natural persons, or non-profit organizations, universities or public research organizations. Large companies, therefore, do not benefit from compensations.

The effects of the language policy of the EPO have been evaluated by Gazzola (2015, 2014) and by Gazzola and Volpe (2014). Table 8 provides a comparative analysis of the costs currently borne by an English-, French-, or German-speaking applicant (*A*) to get a European patent as opposed to the costs faced by a European applicant whose first language is an admissible non-EPO language (*B*).

TABLE 8 – COMPARATIVE ANALYSIS OF THE OVERALL COSTS FOR PATENTING AT THE EPO (IN EUROS)

Type of costs or fee reduction	A	B
Admission translation costs (1)	0	1,700
General fixed costs (2)	5,500	5,500
Granting translation costs (3)	680	680
Interaction translation costs (4)	0	483
Filing fee reduction (5)	0	- 36
Examining fee reduction (6)	0	- 486
Total	6,180	7,841

Source: Adapted and updated from Gazzola (2014: 314)

(1) Average cost for translating a standard patent application (20 pages) into an official language of the EPO;
(2) This item includes, among other things, general fixed costs covering application, search, examination, grant and renewal fees up to the fifth year of the patent;
(3) Costs of translating the claims of the patent into the other two official languages of the EPO (compulsory for every applicant);
(4) Costs of translating amendments to claims or communication with the Office into one of its official languages;
(5) 30% of €120 (on-line filing);
(6) 30% of €1,620.

Admission translation costs (1) and interaction translation costs (4) are a form of implicit costs generated by the language regime of the EPO. These costs are higher than the sum of the fee reductions provided by the compensation scheme of the EPO in favor of European applicants whose first language is an admissible non-EPO language. As a result, the costs incurred to protect technical innovation in Europe are at least 27% higher for a Spanish or Polish small firm using its national language than for an Austrian or Irish competitor doing the same. Thus, the language regime of the EPO generates the paradox that it is *ipso facto* cheaper to protect industrial innovation in Europe for an Australian company than for a Portuguese one. This probably goes against the general spirit of the EPC. The cost gap climbs to 35% for large firms, as they are no entitled to any reduction in fee when filing a European

patent application in an admissible non-EPO language. Measures to reduce such cost disparities are feasible (see Gazzola 2015, and Gazzola 2014 for a discussion).

Let us now turn to WIPO, and more specifically to the branch of the organization dealing with the Patent Cooperation Treaty (PCT). The PCT does not set up a unitary global patent system, but rather a unified international procedure for filing patent applications to protect inventions in each of its contracting states. The International Bureau of WIPO (IB), or Secretariat, based in Switzerland, is responsible for managing the PCT. The IB is the central node of a complex network of IP authorities in the world that act at different stages of the PCT procedures. The language regime of the PCT system is embedded in the complex and multi-layered set of procedures of the PCT which it is not possible to present here (see Gazzola 2014: 195-274). Suffice it to say that the PCT has ten official languages (a.k.a. "languages of publications"), that is, Arabic, Chinese, English, French, German, Japanese, Korean, Portuguese, Russian and Spanish. International patent applications, or PCT applications, must be filed in a language permitted by a competent national or regional IP authority so called "receiving office" (RO). If the application is not drafted in one of the languages of publication of the PCT, the applicant must translate it into one language of publication according to the rules of the RO chosen. Usually, receiving offices, with the exception of the IB of WIPO acting as a RO, accept PCT applications in some (but not all) languages of publication, depending on their geographic location and traditions.

We illustrate the consequence of changing the WIPO language regime by examining the Korean case, added among the languages of publication in 2008 only.[11]

TABLE 9 – AVERAGE GLOBAL COST OF ACCESS TO THE PCT SYSTEM FOR A KOREAN-SPEAKING APPLICANT (IN EUROS)

Fees and admission costs	
Transmittal fee (1)	41
Average international filing fee (2)	1,093
Search fee (3)	293
Admission translation costs (4)	1,700
TOTAL	**3,127**
(4)/Total	54%

Source: Gazzola 2014: 258

(1) Fee requested by the Korean Institute of Intellectual Property (KIPO) acting as RO;
(2) Fee paid to the IB of WIPO;
(3) Fee paid to the Korean Institute of Intellectual Property (KIPO) acting as International Search Authority (ISA);

[11] See Gazzola 2014 for a discussion of the case of Portuguese.

(4) Average cost for translating a standard patent application (20 pages) into a language of publication.

Table 9 shows that the addition of Korean among the languages of publication of the PCT can generate a decrease of 54% in the general costs of access to the PCT procedure for Korean-speaking applicants. The corresponding aggregate savings during the 2009-2010 period was about €11.6 million. Note that filing a patent application in Korean had been possible since 1998, but then a translation into another language of publication (typically English and sometimes Japanese) was necessary within one month of the date of filing.

This is a static impact of adding Korean. Turning to the dynamic or long term impacts, according to various econometric studies (De Rassenfosse and Van Pottelsberghe de la Potterie 2012, 2013), the patent fee elasticity of patent applications ranges between −0.3 and −0.5. By analogy, admission translation costs can be viewed as a form of implicit fee (Gazzola 2014). Assuming an average fee elasticity of −0.4 and given the reduction in costs shown in Table 9, the expected increase in the number of PCT applications filed in Korean during the two to four years following the 2008 reform is 21.6%.[12] As WIPO is a largely self-financing organisation, an increase in the number of patent applications entrails an increase in the fee income of the organisations itself. The increase in fee income due to addition of Korean is likely to have outweighed the increase in the primary costs of the language regime of the PCT (see Gazzola 2014 for a discussion).

The examples presented in this section show that language regimes may have different effects on economic actors interacting with international organisations; such effects can be evaluated and they usually are far from negligible. The design of language regimes, therefore, should be based on an accurate evaluation of the advantages and drawbacks of alternative options and on the assessment of their distributive consequences. Unfortunately, language regimes are too often designed taking only legal or political constraints into account.

4. On the use of stylized facts

Language economists may also be asked, as we have been, to examine the economic aspects of the choice of a language of education with the choice being between the language of wider communication (LWC) and the mother tongue (MT) as the language of instruction (LOI). In this stylized context, no further assumptions are required regarding the type of school environment considered (e.g., primary, secondary, or tertiary; general v. vocational, etc.). However, the results are easier to intuit if one thinks about compulsory education (roughly ages 6 through 15 in most countries). After reviewing four empirical studies, Grin and Vaillancourt (2000) concluded that:

[12] In order to assess the actual effect on the 2008 reform on the number of new patent applications per year filed in Korean, we would need to isolate (i) the effect of exogenous factors such as investments in R&D activities made by Korean firms, and (ii) the number of additional PCT applications that would have been filed anyway but in a different language (e.g. English). Given the data available, it is not possible to delve into this question further (see Gazzola 2014 for a discussion).

- using MT rather than LWC as LOI is likely to lead to favorable educational outcomes: higher test scores, less repetition of grades and less dropping out;
- using MT rather than LWC as LOI is linked to higher costs of the order of 4-5% annually, due to both fixed and recurrent costs. This, however, is an upper-bound estimate, and the extra costs are likely to taper off to 3-4% annually after a few years;
- what can be of interest to the reader is how this could be used to guide policy choices using numerical simulations. The following stylized facts were used.

a) Let us begin by establishing per-student cost in real terms, neglecting inflation. In the basic approach, on may assume constant unit costs across grades and number of students, but depending on the possibility to retrieve more detailed data, a finer-grained approach is of course possible. Sticking to a simple example, this means obtaining the elementary education annual budget from the state, and then dividing it by the number of elementary students for the corresponding year. Let us assume, for the sake of the example, that this yields 100 $ per student per year.

b) If studies have been carried out on issues such as teacher training or other types of educational expenditure, like the preparation and dissemination of school materials, they can be taken into account to calculate the per-student costs of switching from LWC to MT as LOI. If not, one can use, as a rule of thumb based on the results in the four empirical studies, estimates of 5% (low) and 7.5% (high) as a basis for the computation of the additional unit costs per student and per .

c) We then calculate the impact of improved educational outcomes on costs, which requires information on repetition and non- completion rates in a school system using an LWC as the LOI. Assume that when instruction takes place through the LWC, a 40% repetition rate and a 15% non-completion of elementary schooling rate are reported.

A 40% repetition rate in a 5-year program can be represented by 7 years of study; a 20% one, by 6 years, and so on. A 15% non-completion rate will have different cost implications depending on the dropout profile. Dropping out earlier reduces costs more. Assume the following primary schooling dropout profile for a 40% repetition rate as shown in Table 10:

TABLE 10 – DROPOUT AND REPETITION RATES

Year	1	2	2R	3	4	4R	5
Dropout	0	0	0	5%	10%	15%	15%

Note: 'R' stands for a repeated grade; the percentage dropout rates apply to the original cohort.

If no students were to drop out, a 5-year formal elementary degree with two repetitions would cost 700 $ (in real terms per entering child, but in the event that students were to drop out as stated above, it would cost 655 $ (3×100+ 95+90+85+85). The question, then, is the following: what is the direct cost impact of using MT rather than LWC as LOI? This depends on:

- the repetition rate effect: if it goes down, resources can be freed up (if budget flexibility exists). Grin and Vaillancourt (2000) assume, on the basis of the studies they reviewed that it goes down from 40 to 20%;

- the dropout rate effect: if it goes down, this requires mobilizing additional resources. Grin and Vaillancourt (2000) assume that it goes up from 15 to 10%−again, on the basis of the studies reviewed.

We can then compare the following two cost profiles in Table 11.

TABLE 11 COST PROFILE, MT AND LWC AS LOI, MONETARY UNITS PER CAPITA

Year	**LWC cost profile** 40% Repetition 15% Dropout	**MT cost profile** 20% Repetition 10% Dropout 7.5% Extra Costs
1	100	107.5
2	100	107.5
2R	100	107.5
3	95	107.5
4	90	102.1
4R	85	0
5	85	96.7
Total	655	628.8

Source: Grin and Vaillancourt (2000), Table 3

Thus, under plausible assumptions, while using a mother tongue (MT) as a language of instruction (LOI) increases costs, the impact on educational outcomes that have direct cost implications are simulated in such a way that the net cost of using MT as LOI is lower than the one of using LWC as LOI. One could also ascertain the impact on government revenue through the tax intake generated by higher personal income; however, we leave this point aside, since it requires much more information than what is used in our simple stylized argument. The latter, nevertheless, lead us to the conclusion that the reduction in repetition rates associated with switching from LWC to MT as LOI at the primary level is self-financing over the primary cycle. ”

5. Conclusion

Economists have made various contributions to language policy and language planning since the 1970s, although research in this area can be traced back to the 1960s. At the time of writing, applications of language economics to the selection, design and evaluation of language policies are gaining importance, particularly as societies are confronted with new challenges that carry major linguistic implications. The set of processes often subsumed under the label of “globalization” is obviously a strong driver of demand for such analyses, which serve to strengthen the need for information required to address a wide range of problems. These include (and are not restricted to) the need to:

(i) manage mobility of labor between ever more interconnected labor markets with distinct linguistic features, and equip citizens with a broad range of language skills, while ensuring easy access to such skills and preventing them from creating new patterns of social exclusion;

(ii) manage intra –country linguistic diversity as such, which requires particular attention to be devoted to the protection and promotion of small languages, which are still disappearing at an alarming rate;

(iii) balance the roles of major languages against one another, internationally and locally, with a particular concern for avoiding a centripetal drift towards the exclusive use, in a wide range of domains, of a single LWC (the term *lingua franca* being, in this context, improperly used), and bearing in mind that creativity and innovation apparently benefit from the possibility to analyse and process problems through different languages.

The issues at hand are socially important and analytically difficult. They can only be handled in a suitably interdisciplinary perspective. In its 50 years of existence, language economics has been increasingly drawing on other disciplines, in particular the sociology of language, sociolinguistics, and normative political theory, lending it what we see as a necessary—and commendable—interdisciplinary awareness. Interdisciplinary ventures need to be pursued and deepened for a better understanding of multilingualism in society, and we hope that the overview of tools provided in this chapter will inspire many readers to join in this enterprise.

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