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ABSTRACT This article focuses on the contributions from the emerging positivist epistemological approach, endorsed by the economics of language and the economics of education, to study the returns to language skills, assuming that language competencies constitute key components of human capital. It presents initial results from a study on economic returns to language skills in eight countries enrolled in the International Adult Literacy Survey (IALS) – Chile, the Czech Republic, Denmark, Finland, Hungary, Italy, Norway and Italian-speaking Switzerland. The study shows commonalities between countries in terms of language skills valuing, beyond the type of language policy applied at the national level. In each of the eight countries compared, skills in a second language are estimated to be a major factor constraining affecting wage opportunities.

Introduction

At the dawn of the new millennium, debates on language policy are more and more focused on the role of multilingualism and multiculturalism in the globalization process. The complexity of this issue lies mainly in the fact that the process of globalization at the cultural level produces contradictory behaviors. As Stromquist & Monkman (2000) explain:

> While the world is becoming smaller and more homogeneous at some levels, in a variety of ways local cultures are making efforts to retain their identity and, in some cases, even to rediscover it. (p. 7)

Hence, Cvetkovich & Kellner (1997) claim that:

> Although global forces can be oppressive and erode cultural traditions and identities they can also provide new material to rework one's identity and can empower people to revolt against traditional forms and styles to create new, more emancipatory ones. (p. 10)

This paradox is very well captured by Pattanyak (1984) in his overview of the different positions in the current debate:

> The dominant monolingual orientation is cultivated in the developed world and consequently two languages are considered a nuisance, three languages uneconomic and many languages absurd. In multilingual countries, many languages are facts of life; any restriction in the choice of language is a nuisance; and one language is not only uneconomic, it is absurd. (Pattanyak, 1984, quoted in Skutnabb-Kangas & Garcia, 1995, p. 221)

In the face of this complicated climate, where, on the one hand, the labour market is required to homogenize to its maximum its communication tools (i.e. languages of trade) and, on the other hand, national political leaders are fighting for the preservation of the cultural and linguistic

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identity of their people, the education sector serves as the mediator between these two parties.[1] Hence, the sociology of learning in schools is built on the assumption that a polity targeting sustainable development needs to focus on providing children with the knowledge, skills and values needed to make them become competent adult members of the society (Broadfoot, 1994). And so, by definition, the type of language-in-education policy (if any) adopted by a government reflects its ambition to educate a skilled and attractive labour force. As Marland (1977) highlighted in his advocacy for language across the curriculum (LAC): 'If a school devotes thought and time to assisting language development, learning in all areas will be helped; if attention is given to language in the content and skill subjects, language development will be assisted powerfully by the context and purpose of those subjects' (Marland, 1977, quoted in Froese, 1994, p. 3205).

Building on the hypothesis that bilingual education programmes favour cognitive learning, and thereby literacy (Ogbu, 1994; Jacob, 1994; Pease-Alvarez, 1994), and given the contradictory linguistic interpretations of globalization, the question of which languages to choose as part of a bilingual education policy opposes two main linguistics theorist groups, namely, the 'free-market' theorists and the 'green' theorists. On the one hand, the 'free-market' theory of unfettered capitalism defines linguistic geostrategy as a race for 'market share' run by the governments representing the major international languages. On the other hand, the 'green' theory of ecological protection advocates for a linguistic geostrategy of 'protection of endangered languages undertaken by linguists and by those interested in linguistic human rights' (Kibbee, 2003, p. 47).

Although the emergence of this debate results from works in sociolinguistics and linguistics, this article aims to show that economics of education and economics of language contribute to this debate principally via their fundamental assumption that an optimal combination of languages exists for each labour market (Vaillancourt, 1982/1983, p. 167). This hypothesis, which supports the 'free-market' theory, has inspired Vaillancourt (1980) and Lacroix & Vaillancourt (1980, 1981) to elaborate a framework transforming this demand for language skills into a demand for individuals embodying language skills, thereby allowing them to make predictions on the relative earnings of anglophone and francophone salaried in Quebec. A similar framework was used by Boulet (1980) to examine the situation in Montreal. In total, more than two dozen studies have been conducted since 1970 based on this hypothesis and using either a 1/100 sample drawn from the 1971 Census of Canada or data from large-scale surveys. Vaillancourt (1982/1983) highlights that 'All studies make use of regression analysis, usually linking the logarithm of earnings to individual characteristics such as education and age, in addition to language skills' (p. 168). This method is derived from the 'Mincerian' specifications of human capital. The principle is to add to Mincer's (1974) specification of the link between income and its determinants, one or several variables denoting linguistic competences (Grin, 1999, p. 30). The inherent hypothesis is that the higher the level of language competence, the higher the wages.

These studies have the advantage of coherently supporting the validity of the above framework to predict the relative returns to language skills, even when taking into account the level of knowledge of these languages (e.g. Sabourin, 1979; Veltman, Boulet & Castonguay, 1979; Vaillancourt & Pes, 1980; Grenier & Vaillancourt, 1982; Fixman, 1990; Chizwick & Miller, 1992; Grin, 1999). On the other hand, their weakness lies in their use of data sets that are nationally designed and thereby not internationally comparative.

The purpose of this article is therefore to go beyond this limitation by testing the 'free-market' theory on eight countries, using the database provided by the International Adult Literacy Survey (IALS), run between 1994 and 1998. Three countries (Finland, Hungary and Norway) officially apply a bilingual education policy and five (Chile, the Czech Republic, Denmark, Italy and Italian-speaking Switzerland) officially apply another type of language-in-education policy. Table I presents the language policy of all IALS countries covered by this study. Note that these countries have been selected among the 21 countries participating in the IALS, based on availability and reliability of data. Among the linguistic factors influencing wages, the level of literacy in the working language (which is assumed to be the national official language) and the number of languages spoken are retained for this study. One of the objectives is to test the assumption that proficiency in the national language is more significant to immigrants (measured as not born in country of survey) than to native individuals. Further, the number of languages spoken serves to test the assumption that globalization requires skills in foreign languages (free-market theory).

Country	Language policy
Chile	Mixed policy: valorization of official language *and* differentiate status (minority languages). Non-intervention.
Czech Republic	Mixed policy: non-intervention (official language) *and* sector policy (minority languages).
Denmark	Sector policy.
Finland	Bilingualism based on territorial personal rights.
Hungary	Non-intervention and sector policy (minority languages).
Italy	Unilingualism (valorization of the *national* official language).
Norway (Bokmål)	Bilingualism based on personal rights.
Switzerland (Italian-speaking)	Unilinguism (territorial borders between official languages).

Table I. Official language policy of the sample countries.
Source: Based on Leclerc (2001).

Building the hypotheses mainly on results found by previous studies in the United States and in Canada in the past 25 years (with the exception of the works by Grin in Switzerland), this study attempts to test their generalizability at the international level. Interestingly, the studies conducted so far show rather mixed results. For instance, some find that a variable measuring English proficiency is not statistically significant in influencing hourly wages. In the United States, such findings include the studies by Borjas (1984) using the 1976 Survey of Income and Education (SIE) for various Hispanic groups, Reimers (1983, 1985) for males and females in the SIE data set, and Gwartney & Long (1978) and Carliner (1980) using census data. In Canada, Bloom & Grenier (1992), Vaillancourt (1992), Robinson (1988), Chizwick & Miller (1992), Shapiro & Stelcner (1987) and Grenier (1987) failed to find strong language effects on earnings outside Quebec (where the returns to bilingualism in French and English are generally positive), thereby confirming the findings from the United States.

On the other hand, research by Grenier (1984), McManus et al (1983), Kossoudji (1988), Tainer (1988), and Rivera-Batiz (1990), have found significant positive effects of English language proficiency on earnings in the United States. Moreover, in Canada, Christofides & Swidinsky (1998) have shown that, relative to the earnings of unilingual anglophones, the returns to bilingualism have increased significantly between 1971 and 1991 in both Quebec and the rest of Canada, which alters previous results. Further, Grin's (1999) study on the returns to proficiency in a foreign language (namely, English) in Switzerland confirms a significant effect on earnings.

Rivera-Batiz's (1990) and Grin's (1999) studies differ from the other studies in their use of test-based measurements of language proficiency, rather than self-assessed subjective measurements. The present study offers similar reliability for skills in the official national language(s) by using the test-based measurement of prose, document and quantitative literacy computed by the IALS. However, skills in foreign languages are based on self-assessment.

Because the aim of this study is to test the free-market theory, this article addresses the following specific questions:

1. Does proficiency in the official national language(s) have a significant effect on wage level?
2. Does this effect differ by gender and between native and non-native individuals to the country of survey?
3. Are language skills more rewarded in countries applying an official bilingual policy then in countries applying another type of language policy?

The Empirical Model

This study applies the following empirical human capital model, estimated separately for men and women, and native and non-native individuals in each country of the sample:

$$\log W_{ijk} = \beta' X_{ijk} + U_{ijk},$$

where W_{ijk} is the estimate of personal income from only wages, salary or self-employment in the year of the survey received by individual i of gender j, and place of birth k (i.e. in or not in country

of survey); b is a vector of coefficients to be estimated; X_{ijk} is a vector of human capital and demographic characteristics affecting wages; and U_{ijk} is a stochastic disturbance.

In order to determine the role played by language proficiency on earnings, three human capital equations have been computed. The first one is a 'standard' human capital equation, where vector includes two key explanatory variables. The first is years of schooling, *a7*, as an indication of the impact of academic skills on earnings. The second is years of on-the-job experience, proxied by the variable *exper*, measured as age minus years of schooling minus six [2], to incorporate the effect of non-academic skills on wages.

The second human capital equation adds to the first one the scores received by individuals in literacy, as measured by the IALS. The IALS defines three domains of literacy:

> (a) *Prose Literacy* – the knowledge and skills needed to understand and use information from texts including editorials, news stories, poems, and fiction;
>
> (b) *Document literacy* – the knowledge and skills required to locate and use information contained in various formats, including job applications, payroll forms, transportation schedules, maps, tables, and graphics; and
>
> (c) *Quantitative literacy* – the knowledge and skills required to apply arithmetic operations, either alone or sequentially, to numbers embedded in printed materials, such as balancing a checkbook, calculating a tip, completing an order form, or determining the amount of interest on a loan from an advertisement. (Statistics Canada, 2002, p. 15)

For each of these three scales (prose, document and quantitative), individuals are assigned scores, ranging from 0 to 500, according to how well they perform on a number of tasks of varying difficulty. The scale scores are in turn grouped into five empirically determined literacy levels, each of them implying an ability to cope with a particular subset of reading tasks. Variables *prose*, *doc* and *quant* provide the average score for prose literacy, document literacy and quantitative literacy respectively (see Table II for a definition of each level and score range).

Level	Score range	Definition
		Prose Literacy
Level 1	0-225	Most of the tasks at this level require the reader to locate one piece of information in the text that is identical to or synonymous with the information given in the directive. If a plausible incorrect answer is present in the text, it tends not to be near the correct information.
Level 2	226-275	Tasks at this level generally require the reader to locate one or more pieces of information in the text, but several distracters may be present, or low-level inferences may be required. Tasks at this level also begin to ask readers to integrate two or more pieces of information, or to compare and contrast information.
Level 3	276-325	Tasks at this level generally direct readers to locate information that requires low-level inferences or that meets specified conditions. Sometimes the reader is required to identify several pieces of information that are located in different sentences or paragraphs rather than in a singular sentence. Readers may also be asked to integrate or to compare and contrast information across paragraphs or sections of text.
Level 4	326-375	These tasks require readers to perform multiple-feature matching or to provide several responses where the requested information must be identified through text-based inferences. Tasks at this level may also require the reader to integrate or contrast pieces of information, sometimes presented in relatively lengthy texts. Typically, these texts contain more distracting information, and the information requested is more abstract.
Level 5	376-500	Tasks at this level typically require the reader to search for information in dense text that contains a number of plausible distracters. Some require readers to make high-level inferences or to use specialized knowledge.
		Document Literacy
Level 1	0-225	Most of the tasks at this level require the reader to locate a single piece of information based on a literal match. Distracting information, if present, is typically located away from the current answer. Some tasks may direct the readers to enter personal information onto a form.

Level 2	226-275	Document tasks at this level are a bit more varied. While some still require the reader to match a single feature, more distracting information may be present or the match may require a low-level inference. Some tasks at this level may require the reader to enter information onto a form or to cycle through information in a document.
Level 3	276-325	Tasks at this level are varied. Some require the reader to make literal or synonymous matches, but usually the reader must take conditional information into account or match on the basis of multiple features of information. Some require the reader to integrate information from one or more displays of information. Others ask the reader to cycle through a document to provide multiple responses.
Level 4	326-375	Tasks at this level, like those at the previous levels, ask the reader to match on the basis of multiple features of information, to cycle through documents, and to integrate information; frequently, however, these tasks require the reader to make higher-order inferences to arrive at the correct answer. Sometimes the document contains conditional information that must be taken into account by the reader.
Level 5	376-500	Tasks at this level require the reader to search through complex displays of information that contain multiple distracters, to make high-level inferences, process conditional information, or use specialized knowledge.
		Quantitative Literacy
Level 1	0-225	Although no quantitative tasks used in the assessment fall below the score value of 225, experience suggests that such tasks would require the reader to perform a single, relatively simple operation (usually addition) for which either the numbers are clearly noted in the given document and the operation is stipulated, or the numbers are provided and the operation does not require the reader to find the numbers.
Level 2	226-275	Tasks at this level typically require readers to perform a single arithmetic operation (frequently addition or subtraction), using numbers that are easily located in the text or document. The operation to be performed may be easily inferred from the wording of the question or the format of the material (for example, a bank deposit or order forms).
Level 3	276-325	Tasks at this level typically require the reader to perform a single operation. However, the operations become more varied – some multiplication and division tasks are included. Sometimes the reader needs to identify two or more numbers from various places in the document, and the numbers are frequently embedded in complex displays. While semantic relation terms such as 'how many' or 'calculate the difference' are often used, some of the tasks require the reader to make higher-order inferences to determine the appropriate operation.
Level 4	326-375	With one exception, the tasks at this level require the reader to perform a single arithmetic operation where typically either the quantities or the operation are not easily determined. That is, for most of the tasks at this level, the question or directive does not provide a semantic relation term such as 'how many' or 'calculate the difference' to help the reader.
Level 5	376-500	These tasks require readers to perform multiple operations sequentially, and they must locate features of the problem embedded in the material or rely on background knowledge to determine the quantities or operations needed.

Table II. Literacy levels and score ranges. Source: Statistics Canada, 2002.

Finally, the third human capital equation adds skills in two languages, proxied by the dummy variable *lang2*, which equals 1 if the person can conduct a conversation in a foreign language in addition to the national official language, and zero otherwise. Although this variable is based on self-assessment, and can therefore not be considered as evidence of bilingual proficiency, it helps to measure the significance given by the labour market to language competences beyond the official national language.

Only individuals for whom non-zero wages are observed are retained for the analysis. This implies a non-random selection of cases, which biases the error term. This selectivity bias problem could be solved with the two-stage sample selection bias correction procedure postulated by Heckman (1979).

Results

The results for the countries of our sample are grouped by type of national language policy (bilingual and other types). Tables AI(a) and (b) (see Appendix) depict the sample means for bilingual and non-bilingual countries respectively for the variables included in the analysis. Tables AII(a) and (b) (see Appendix) show the results for native men and women in bilingual and non-bilingual countries respectively. Whenever possible, results have been computed for individuals born in another country than the country of survey to look for eventual differences of results with the individuals born in the country of survey.

For comparison purposes, equation (1) presents the estimated coefficients when all variables on language skills are excluded from the wage equation. Equation (2) then shows the results when the variables in prose, document and quantitative literacy in the official national language are included. Finally, equation (3) presents the results including skills in two. Note that cases with negative adjusted R^2 are not presented in these tables.

(1) $\log W_{ijk} = \beta_0 + \beta_1 a_7 + \beta_2 \exp er + U_{ijk}$

(2) $\log W_{ijk} = \beta_0 + \beta_1 a_7 + \beta_2 \exp er + \beta_3 prose + \beta_4 doc + \beta_5 quant + U_{ijk}$

(3) $\log W_{ijk} = \beta_0 + \beta_1 a_7 + \beta_2 \exp er + \beta_3 prose + \beta_4 doc + \beta_5 quant + \beta_6 lang2 + U_{ijk}$

Countries applying bilingual (or multilingual) policies are assumed to value skills in two languages more than countries applying other types of language policies. This implies that the significance of *lang2* on wages is expected to be higher in bilingual countries. Conversely, proficiency in the official national language is expected to have a higher significance in countries valorizing their unique official language.

First, the results presented in this article show that the three human capital equations estimated in this study provide a sufficient percentage of explanation of variations in wages only for Finnish men and women born in Finland (between 12.2 and 13.8%), Norwegian men born in Norway (between 11.2 and 12.7%), Danish men born in Denmark (between 12.5 and 13.3%) and women living in Italy and born abroad (up to 21.9%). For all other cases, the low level of adjusted R^2 highlights the need to refine the estimated equations. However, previous empirical studies applying the same Mincerian approach did not obtain higher explanation degrees, which allows us nevertheless to treat our results as valid.

In the two countries applying a national policy of bilingualism (Finland and Norway) linguistic skills, both in terms of literacy skills in the national official language and skills in a second language, have a significant effect on wages, as demonstrated by the increasing adjusted R^2 when incorporating the linguistic variables. However, the weights estimated for *pros*, *doc* and *quant* are very small compared to the weights estimated for *lang2*. This shows that for individuals born in the country of residency and work, although they can influence the type of work and thereby the income range one is eligible for, literacy skills in the national official language are not a requirement for wage improvements. On the other hand, the weight estimated for second language skills is greater than the weights estimated for educational level and professional experience in both countries. It is, however, worth noticing that although Swedish is the second official language of Finland, 55% of the Finnish population has English as the second language (41.7% speaks Swedish as the second language). The same applies to Norway, with English being spoken by 93% of the Bokmål-speaking population as the second language.

Moreover, looking at the results for the six countries applying a national language policy other than bilingualism (Chile, the Czech Republic, Denmark, Hungary, Italy and Italian-speaking Switzerland), it appears that despite the explicative weakness of the model, the inclusion of language skill variables also improves the adjusted R^2. It is interesting to see that skills in a second language are as praised by the labour market in non-bilingual countries as they are in bilingual countries and that the role played by literacy in the national official language varies strongly between countries and even between types of literacy skills. Furthermore, second language skills are more valued in women's wages than in men's wages in all countries of our sample except Switzerland (Italian-speaking part). These differences could be explained by the distribution of gender by type of professional occupation.

When examining the nature of the second language spoken by the individuals of our sample it is striking to see that English comes first in Chile (58%) and Denmark (79%), and second in Hungary after German (29% versus 52%) and in Italy after French (35% against 44%). The only exception to this trend in favour of English as common communication means are the Czech Republic, where 41% of the population still speaks Russian as a second language before German (20%) – English comes only in third position with 14 % – and the Italian-speaking part of Switzerland with 58% speaking the regional dialect, 24% speaking German, and 13% French [3] (only 1.5% for English). From this distribution of languages it is clear that the choice of the second language is more highly correlated to economic factors than the choice of the first language, which is still very much correlated to sociocultural and historical factors. This finding for second languages supports the free-market theory, which states that the choice of languages should be ruled by competitiveness.

Finally, although one of the objectives of this study was to compare results for men and women according to their place of birth (assuming that immigrants would be included in the individuals not born in the country of survey), lack of valid data for individuals born outside the country of survey in all the countries of our sample – except for Norway and the Italian-speaking part of Switzerland – hinders us from drawing any conclusions from that angle (see Tables III(a) and (b) for sample means by gender and place of birth). In the case of Norway, none of the three human capital equations tested has the capacity to explain more than 0.5% of the variations in wages for men born abroad, and in the Swiss case, the inclusion of the linguistic variables diminishes the explanatory level of the model, implying that the sources of variations of wages of non-natives should be sought among other factors.

Conclusions

This article is one of the rare studies on economic returns to language skills conducted at the international level that makes use of a test-based measure of literacy skills in national official language and a self-assessment measure of competences in a second language to estimate the role played by language skills in explaining earnings in eight countries. This article thereby contrasts with the previous literature in this field, which has used non-comparative national data sets.

This analysis demonstrates the existence of commonalities between countries in terms of language skills valuing, which go beyond the type of language policy applied at the national level. In each of the eight countries compared, skills in a second language are estimated to be a major factor constraining wage opportunities.

The initial objective of this empirical study was to test the free-market theory according to which 'competitive' bilingualism or multilingualism needs to prevail over 'ecological' multilingualism. Based on the nature of the second languages spoken by our sample, and on their estimated economic return, this study validates fully the free-market theory. However, the returns to literacy skills in the official national language (assumed to be equal to the working language) were expected to be higher. The re-computation of literacy skills as an average of prose, document and quantitative literacy might alter this result in favour of the free-market theory, i.e. in favour of high skills in the language of the market. Finally, a suggestion for further research would be to add a control for the type of professional occupation in order to explain better the differences in returns to language skills by countries, genders, native vs. non-natives, and even individuals of the same group.

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Notes

[1] Educationalists, such as Giddens (1994) and Stromqvist & Monkman (2000) are increasingly interested in the role of globalization in the reconceptualization of knowledge.

[2] On average, compulsory education starts at the age of six at the international level, including in the countries of this sample. It is therefore commonly admitted to define *exper* as age minus years of schooling minus 6 (Rivera-Batiz, 1990).

[3] Together with Italian and Romansh, German and French are the official languages of Switzerland.

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APPENDIX

Variables	Born in country of survey				Not born in country of survey			
	Males		Females		Males		Females	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Finland								
wage	982256	2785377	1038858	2926830	1495678	3536005	1314993	3390997
a7	12.59	3.545	13.11	3.451	13.00	2.867	14.44	2.898
exper	19.29	12.879	18.69	12.904	11.68	10.111	9.69	9.075
prose	291.72	41.78	303.56	39.17	282.70	69.39	311.01	59.69
doc	298.77	47.01	301.23	44.48	290.66	58.67	300.56	59.58
quant	298.43	41.41	291.68	38.96	285.37	55.81	289.30	57.57
lang2	0.51	0.500	0.58	0.591	0.79	0.418	0.88	0.342
Number of observations	1104		1049		28		16	
Norway								
wage	1107591	2781348	1546490	3427086	1936607	3765607	2203896	4019355
a7	12.53	4.621	12.42	3.705	15.92	8.942	14.71	3.769
exper	20.93	13.726	20.36	13.265	16.01	13.548	16.55	10.754
prose	291.68	37.35	302.31	36.03	266.56	65.42	286.05	62.37
doc	306.91	44.39	305.11	43.41	278.25	77.33	289.97	68.34
quant	308.22	43.65	303.03	40.58	287.56	65.28	290.04	58.38
lang2	0.8215	0,38308	0.8324	0.37367	0.9813	0.13607	0.9740	0.16010
Number of observations	1227		1241		107		77	

Table AI(a). Sample means for wage equations, by gender and place of birth: countries applying a bilingual policy.

Variables	Born in country of survey				Not born in country of survey			
	Males		Females		Males		Females	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Chile								
wage	12960155	31289941	17550442	36682533	39025000	50570700	-	-
a7	9.04	4.385	10.47	4.031	13.63	6.093	-	-
exper	22.54	14.317	19.05	13.376	14.13	12.357	-	-
prose	208.57	56.116	228.09	50.262	267.99	52.952	-	-
doc	212.88	55.844	224.11	48.452	276.48	69.506	-	-
quant	203.40	71.569	211.26	64.172	281.06	74.126	-	-
lang2	0.10	0.296	0.08	0.272	0.50	0.535	-	-
Number of observations	1361		873		8		1	
Czech Republic								
wage	2880509	4422884.2	2963418	4498970	2079200	4174691.3	2107485	4085639.4
a7	13.57	4.754	13.02	4.331	10.60	1.430	13.07	3.369
exper	21.75	12.451	22.23	11.864	32.10	10.027	27.53	11.281
prose	274.32	39.326	275.41	37.546	250.11	33.613	258.82	47.891
doc	292.71	49.066	286.00	47.430	270.69	37.604	272.48	68.465
quant	310.20	50.701	301.32	47.657	277.93	45.189	267.78	64.347
lang2	0.55	0.498	0.58	0.494	1.00	0.000	1.00	0.000
Number of observations	1061		1245		10		10	

Denmark								
wage	4806046	19880645	9896876	28032362	7974555	25532464	19440242	37425373
a7	13.14	4.051	13.03	3.893	14.04	3.457	11.83	3.099
exper	19.13	13.299	18.96	12.944	22.30	12.879	23.09	12.979
prose	278.22	32.743	283.46	32.198	259.33	46.675	266.18	39.142
doc	304.47	42.036	297.26	40.577	283.51	59.923	271.71	52.740
quant	310.80	40.365	297.90	39.552	292.40	61.702	281.01	49.656
lang2	0.86	0.349	0.89	0.309	0.96	0.209	0.96	0.209
Number of observations	1318		1197		23		23	
Italy								
wage	273315	414803.94	312356	445827.69	274356	426839.80	410619	491194.95
a7	12.17	4.077	12.26	3.889	13.50	4.194	12.12	4.729
exper	22.18	11.701	19.29	11.306	17.43	8.664	16.20	10.275
prose	258.56	53.078	268.94	51.041	262.46	41.934	250.92	55.253
doc	258.28	53.293	254.60	49.885	265.01	44.743	241.71	61.151
quant	271.12	55.567	263.08	51.892	279.52	42.332	249.17	58.619
lang2	0.32	0.467	0.31	0.464	0.54	0.508	0.76	0.436
Number of observations	971		802		28		25	
Slovenia								
wage	643475	761179.81	542160	643940.61	603367	636767.92	637158	745881.44
a7	11.47	2.844	11.77	2.874	10.84	3.190	10.54	3.242
exper	19.19	11.814	18.20	11.689	22.09	10.599	22.07	9.665
prose	230.46	52.332	249.55	49.802	208.65	60.946	218.84	60.914
doc	240.64	59.646	249.63	56.567	212.98	66.019	212.94	67.370
quant	252.04	64.021	257.46	58.394	225.01	69.251	222.69	64.889
lang2	0.84	0.365	0.73	0.444	0.97	0.172	0.95	0.210
Number of observations	947		904		99		109	
Switzerland								
wage	1567338	3565222.8	1866260	3863863.8	1601025	3615315.4	1645139	3689831.4
a7	13.86	2.860	13.20	5.352	12.12	4.652	11.10	3.785
exper	18.79	12.820	19.65	13.801	26.45	13.440	24.76	12.360
prose	285.16	38.957	282.58	38.746	245.54	53.354	246.63	58.898
doc	292.36	39.293	283.11	39.722	257.36	54.155	246.00	58.454
quant	303.67	43.996	288.88	41.973	262.19	59.373	249.15	60.239
lang2	0.9846	0.12345	0.9883	0.10752	0.9052	0.29425	0.9333	0.25064
Number of observations	324		343		116		105	
Hungary								
wage	20601578	37899973	19202275	36963758	27951944	43043159	13948922	32496006
a7	12.80	7.698	12.93	6.949	13.67	3.559	15.25	3.980
exper	19.64	13.481	19.56	12.728	24.00	15.887	21.92	12.471
prose	241.89	38.27	253.61	37.78	236.11	48.34	282.48	36.63
doc	255.45	48.97	256.61	48.62	250.07	50.21	277.43	44.14
quant	278.04	48.27	278.95	48.57	265.91	53.32	267.40	89.33
lang2	0.19	0.391	0.26	0.438	0.50	0.548	1.00	0.000
Number of observations	752		763		6		12	

Table AI(b). Sample means for wage equations, by gender and place of birth: countries applying a non-bilingual policy.

(i)Finland

Gender	Independent variable	Dependent variable: Natural logarithm of annual wage rate (quintile)								
		(1) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|	(2) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|	(3) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|
Born in country of survey										
Men	*Intercept*	9.446	39.746	0.000	10.486	24.663	0.000	10.366	23.999	0.000
	a7	0.106	7.103	0.000	0.124	7.542	0.000	0.131	7.680	0.000
	exper	0.051	12.279	0.000	0.046	10.134	0.000	0.045	9.785	0.000
	prose				-0.013	-4.391	0.000	-0.013	-4.170	0.000
	doc				0.007	2.143	0.032	0.008	2.209	0.027
	quant				0.002	0.495	0.621	0.001	0.393	0.694
	lang2							-0.179	-1.540	0.124
	Adjusted R^2	0.122			0.136			0.137		
Dependent variable mean: 11.76, Number of observations: 1104.										
Women	*Intercept*	9.644	35.732	0.000	11.253	20.695	0.000	11.289	20.663	0.000
	a7	0.059	3.522	0.000	0.071	4.044	0.000	0.069	3.831	0.000
	exper	0.055	12.269	0.000	0.047	9.001	0.000	0.047	8.991	0.000
	prose				-0.013	-3.787	0.000	-0.013	-3.821	0.000
	doc				0.003	0.872	0.383	0.003	0.833	0.405
	quant				0.004	1.119	0.263	0.004	1.147	0.252
	lang2							0.070	0.693	0.488
	Adjusted R^2	0.125			0.138			0.137		
Dependent variable mean: 11.45, Number of observations: 1049.										

(ii) Norway

Gender	Independent variable	Dependent variable: Natural logarithm of annual wage rate (quintile)								
		(1) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|	(2) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|	(3) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|
Born in country of survey										
Men	*Intercept*	10.816	66.675	0.000	10.963	29.220	0.000	10.976	29.217	0.000
	a7	0.062	6.446	0.000	0.051	5.007	0.000	0.051	4.989	0.000
	exper	0.040	12.292	0.000	0.034	9.465	0.000	0.035	9.444	0.000
	prose				-0.011	-3.595	0.000	-0.011	-3.633	0.000
	doc				0.000	-0.135	0.892	0.000	-0.151	0.880
	quant				0.011	3.859	0.000	0.011	3.812	0.000
	lang2							0.088	0.725	0.469
	Adjusted R^2	0.112			0.127			0.127		
Dependent variable mean: 12.42, Number of observations: 1227.										
Women	*Intercept*	11.419	51.626	0.000	12.153	23.448	0.000	12.173	23.474	0.000
	a7	0.036	2.517	0.012	0.040	2.673	0.008	0.039	2.559	0.011
	exper	0.022	5.603	0.000	0.017	3.793	0.000	0.018	3.924	0.000
	prose				-0.001	-0.366	0.714	-0.002	-0.436	0.663
	doc				-0.006	-1.516	0.130	-0.006	-1.590	0.112
	quant				0.005	1.324	0.186	0.005	1.334	0.183
	lang2							0.164	1.073	0.284
	Adjusted R^2	0.024			0.025			0.025		
Dependent variable mean: 12.31, Number of observations: 1241.										
Not born in country of survey										
Men	*Intercept*	11.516	15.840	0.000	10.790	9.823	0.000	12.217	6.988	0.000
	a7	0.037	1.298	0.197	0.024	0.770	0.443	0.029	0.928	0.356
	exper	0.028	1.467	0.146	0.024	1.233	0.220	0.026	1.346	0.181
	prose				0.001	0.110	0.913	0.001	0.122	0.903
	doc				-0.015	-1.456	0.148	-0.015	-1.435	0.154
	quant				0.017	1.647	0.103	0.016	1.586	0.116
	lang2							-1.497	-1.049	0.297
	Adjusted R^2	0.003			0.004			0.005		
Dependent variable mean: 12.56, Number of observations: 107.										

Table AII(a). Estimated coefficients, human capital wage equations: countries applying a bilingual policy.
(Note: only cases presenting positive adjusted R^2 are presented in these tables. For details about cases not presented here, please contact the author.)

(i) Chile

Gender	Independent variable	Dependent variable: Natural logarithm of annual wage rate (quintile)								
		(1) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|	(2) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|	(3) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|
Born in country of survey										
Men	*Intercept*	12.835	69.509	0.000	12.492	41.889	0.000	12.485	41.780	0.000
	a7	0.138	10.915	0.000	0.107	6.032	0.000	0.108	6.035	0.000
	exper	0.015	3.781	0.000	0.015	3.726	0.000	0.015	3.746	0.000
	prose				0.001	0.243	0.808	0.001	0.280	0.779
	doc				0.001	0.403	0.687	0.001	0.373	0.710
	quant				0.001	0.384	0.701	0.001	0.384	0.701
	lang2							-0.063	-0.402	0.688
	Adjusted R^2	0.085			0.087			0.087		
Dependent variable mean: 14.41, Number of observations: 1361.										
Women	*Intercept*	12.073	41.692	0.000	11.454	22.730	0.000	11.490	22.776	0.000
	a7	0.154	7.821	0.000	0.094	3.570	0.000	0.088	3.313	0.000
	exper	0.036	6.065	0.000	0.036	6.141	0.000	0.037	6.150	0.000
	prose				0.004	0.997	0.319	0.005	1.061	0.289
	doc				-0.002	-0.456	0.648	-0.003	-0.497	0.619
	quant				0.004	0.941	0.347	0.003	0.914	0.361
	lang2							0.336	1.300	0.194
	Adjusted R^2	0.069			0.078			0.079		
Dependent variable mean: 14.37, Number of observations: 873.										

(ii) Czech Republic

Gender	Independent variable	Dependent variable: Natural logarithm of annual wage rate (quintile)								
		(1) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|	(2) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|	(3) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|
Born in country of survey										
Men	*Intercept*	12.192	45.991	0.000	12.685	23.782	0.000	12.732	23.715	0.000
	a7	0.026	1.824	0.069	0.025	1.729	0.084	0.023	1.586	0.113
	exper	0.014	2.474	0.014	0.008	1.356	0.175	0.008	1.404	0.160
	prose				-0.009	-2.392	0.017	-0.009	-2.469	0.014
	doc				-0.012	-3.134	0.002	-0.012	-3.167	0.002
	quant				0.018	5.036	0.000	0.018	5.073	0.000
	lang2							0.108	0.780	0.436
	Adjusted R^2	0.005			0.027			0.026		
Dependent variable mean: 12.84, Number of observations: 1061.										
Women	*Intercept*	12.275	40.892	0.000	13.538	22.796	0.000	13.541	22.802	0.000
	a7	0.032	1.967	0.049	0.031	1.869	0.062	0.029	1.760	0.079
	exper	-0.004	-0.731	0.465	-0.012	-1.986	0.047	-0.012	-1.845	0.065
	prose				-0.010	-2.575	0.010	-0.010	-2.634	0.009
	doc				-0.014	-3.338	0.001	-0.014	-3.360	0.001
	quant				0.019	4.746	0.000	0.019	4.755	0.000
	lang2							0.149	1.078	0.281
	Adjusted R^2	0.004			0.024			0.024		
Dependent variable mean: 12.60, Number of observations: 1245.										

(iii) Denmark

Gender	Independent variable	Dependent variable: Natural logarithm of annual wage rate (quintile)								
		(1) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|	(2) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|	(3) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|
Born in country of survey										
Men	*Intercept*	10.529	58.758	0.000	11.271	27.542	0.000	11.268	27.513	0.000
	a7	0.080	7.184	0.000	0.084	7.117	0.000	0.083	7.052	0.000
	exper	0.045	13.215	0.000	0.045	12.075	0.000	0.045	11.751	0.000
	prose				-0.015	-3.986	0.000	-0.015	-3.985	0.000
	doc				0.009	2.335	0.020	0.009	2.312	0.021
	quant				0.002	0.736	0.462	0.002	0.752	0.452
	lang2							0.032	0.223	0.824
	Adjusted R^2	0.125			0.133			0.132		
Dependent variable mean: 12.43, Number of observations: 1318.										
Women	*Intercept*	11.318	39.978	0.000	12.773	19.817	0.000	12.698	19.717	0.000
	a7	0.048	2.739	0.006	0.064	3.459	0.001	0.063	3.452	0.001
	exper	0.027	5.139	0.000	0.027	4.677	0.000	0.030	5.060	0.000
	prose				-0.011	-2.042	0.041	-0.013	-2.404	0.016
	doc				0.008	1.527	0.127	0.008	1.504	0.133
	quant				-0.003	-0.729	0.466	-0.003	-0.612	0.540
	lang2							0.555	2.423	0.016
	Adjusted R^2	0.021			0.025			0.029		
Dependent variable mean: 12.45, Number of observations: 1197.										

(iv) Hungary

Gender	Independent variable	Dependent variable: Natural logarithm of annual wage rate (quintile)								
		(1) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|	(2) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|	(3) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> |t|
Born in country of survey										
Men	*Intercept*	10.984	27.442	0.000	10.299	11.522	0.000	10.476	11.726	0.000
	a7	0.057	3.129	0.002	0.046	2.521	0.012	0.043	2.325	0.020
	exper	0.034	3.292	0.001	0.028	2.539	0.011	0.030	2.682	0.007
	prose				-0.021	-3.183	0.002	-0.021	-3.237	0.001
	doc				0.002	0.413	0.680	0.002	0.305	0.761
	quant				0.019	3.458	0.001	0.019	3.417	0.001
	lang2							0.788	2.529	0.012
	Adjusted R^2	0.015			0.037			0.043		
Dependent variable mean: 12.39, Number of observations: 752.										
Women	*Intercept*	11.517	27.629	0.000	10.129	10.147	0.000	10.199	10.221	0.000
	a7	0.024	1.203	0.229	0.011	0.534	0.593	0.012	0.606	0.545
	exper	0.014	1.347	0.178	0.015	1.323	0.186	0.018	1.591	0.112
	prose				-0.005	-0.758	0.448	-0.006	-0.857	0.391
	doc				-0.005	-0.948	0.343	-0.005	-0.961	0.337
	quant				0.015	2.810	0.005	0.015	2.757	0.006
	lang2							0.481	1.689	0.092
	Adjusted R^2	0.000			0.011			0.013		
Dependent variable mean: 12.10, Number of observations: 763.										

(v) Italy

Gender	Independent variable	Dependent variable: Natural logarithm of annual wage rate (quintile)								
		(1) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> | t |	(2) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> | t |	(3) Parameter estimate	*t*-statistic H_0: $\beta = 0$	Prob> | t |
Born in country of survey										
Men	*Intercept*	10.257	42.300	0.000	10.090	29.367	0.000	10.086	29.303	0.000
	a7	0.044	3.123	0.002	0.036	2.226	0.026	0.037	2.217	0.027
	exper	0.018	3.586	0.000	0.015	3.010	0.003	0.015	3.007	0.003
	prose				-0.007	-2.682	0.007	-0.007	-2.658	0.008
	doc				-0.002	-0.642	0.521	-0.002	-0.655	0.513
	quant				0.010	2.895	0.004	0.010	2.898	0.004
	lang2							-0.027	-0.226	0.821
	Adjusted R^2	0.014			0.026			0.025		
Dependent variable mean: 11.18, Number of observations: 971.										
Women	*Intercept*	10.563	30.121	0.000	10.850	21.998	0.000	10.863	21.923	0.000
	a7	0.015	0.733	0.464	0.014	0.591	0.555	0.012	0.509	0.611
	exper	0.013	1.795	0.073	0.008	1.107	0.269	0.008	1.116	0.265
	prose				-0.009	-2.364	0.018	-0.009	-2.373	0.018
	doc				-0.008	-1.599	0.110	-0.008	-1.603	0.109
	quant				0.016	3.655	0.000	0.016	3.660	0.000
	lang2							0.046	0.289	0.773
	Adjusted R^2	0.002			0.017			0.016		
Dependent variable mean: 11.00, Number of observations: 802.										

(vi) Switzerland (Italian-speaking)

Gender	Independent variable	Dependent variable: Natural logarithm of annual wage rate (quintile)								
		(1) Parameter estimate	*t*-statistic H_0: β = 0	Prob> |t|	(2) Parameter estimate	*t*-statistic H_0: β = 0	Prob> |t|	(3) Parameter estimate	*t*-statistic H_0: β = 0	Prob> |t|
Born in country of survey										
Men	*Intercept*	9.754	14.325	0.000	10.387	9.896	0.000	9.207	7.090	0.000
	a7	0.079	1.860	0.064	0.093	2.022	0.044	0.083	1.791	0.074
	exper	0.041	4.312	0.000	0.038	3.794	0.000	0.036	3.549	0.000
	prose				-0.005	-0.873	0.383	-0.006	-0.907	0.365
	doc				-0.001	-0.204	0.838	-0.001	-0.223	0.824
	quant				0.004	0.676	0.500	0.004	0.696	0.487
	lang2							1.442	1.538	0.125
	Adjusted R^2	0.049			0.044			0.048		
Dependent variable mean: 11.61, Number of observations: 324.										
Women	*Intercept*	10.543	19.201	0.000	13.125	10.633	0.000	13.142	7.844	0.000
	a7	0.017	0.573	0.567	0.027	0.906	0.366	0.027	0.905	0.366
	exper	0.025	2.204	2.204	0.019	1.535	0.126	0.019	1.530	0.127
	prose				-0.015	-2.079	0.038	-0.015	-2.060	0.040
	doc				0.004	0.438	0.662	0.004	0.434	0.664
	quant				0.002	0.303	0.762	0.002	0.303	0.762
	lang2							-0.018	-0.014	0.988
	Adjusted R^2	0.009			0.024			0.021		
Dependent variable mean: 11.25, Number of observations: 343.										
Not born in country of survey										
Men	*Intercept*	11.578	13.367	0.000	12.154	10.358	0.000	11.829	9.680	0.000
	a7	-0.016	-0.355	0.723	0.033	0.593	0.554	0.028	0.507	0.614
	exper	0.009	0.546	0.586	0.010	0.642	0.522	0.008	0.490	0.625
	prose				-0.027	-2.717	0.008	-0.027	-2.699	0.008
	doc				0.019	1.901	0.060	0.018	1.816	0.072
	quant				0.002	0.261	0.795	0.002	0.279	0.781
	lang2							0.624	0.958	0.340
	Adjusted R^2	-0.011			0.032			0.032		
Dependent variable mean: 11.61, Number of observations: 116.										
Women	*Intercept*	8.643	7.921	0.000	8.586	6.162	0.000	8.381	5.152	0.000
	a7	0.052	0.782	0.436	0.043	0.543	0.588	0.040	0.500	0.618
	exper	0.072	3.527	0.001	0.074	3.517	0.001	0.074	3.485	0.001
	prose				0.009	0.800	0.426	0.009	0.807	0.422
	doc				0.001	0.118	0.907	0.002	0.127	0.899
	quant				-0.010	-0.756	0.451	-0.010	-0.762	0.448
	lang2							0.228	0.247	0.806
	Adjusted R^2	0.098			0.078			0.069		
Dependent variable mean: 11.01, Number of observations: 105.										

Table AII(b). Estimated coefficients, human capital wage equations: countries applying a non-bilingual policy
(Note: only cases presenting positive adjusted R^2 are presented in these tables. For details about cases not presented here, please contact the author.)

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