Appendix for "The Wage Gap between Francophones and Anglophones:

A Canadian Perspective, 1970 to 2000"

Appendix 1   Data

Because of changes in the Census questionnaire and in data-processing only some of the Census data across years are fully comparable. Certain procedures, described below, were taken to make the data in this analysis as reliable, uniform, and comparable across years as possible. All data and data-processing files are available upon request.

Annual earnings are the sum of "wage and salary income" and "self employment earnings," both reported for the previous year. Earnings are adjusted to 2000 dollars using the Canadian CPI – All Items, and truncated at $200,000 as this is the lowest truncation cut-off used in all years in real terms. Hourly wages are obtained by dividing annual earnings by weeks worked in the previous year and hours worked.   To mitigate measurement problems, the wage sample excludes observations with wage rates of less than $2 per hour or $60 per week.

The measure of hours worked available in 1971 differs from that of other years: in 1971 the measure refers to *usual* hours on the *main* job in the reference week prior to Census Day; in later years, the measure refers to *actual* hours worked in *all* jobs in the reference week. This could produce potential measurement problems in comparing hourly wage changes across years, especially in later years where the reference week does not occur in the previous year from which earnings are taken. However, it is not clear that these measurement problems create any important problems in comparing changes across years of the hourly wage differences between Francophones and Anglophones, or between workers in and out Quebec, as such problems are probably

differenced out. In 1971, hours and weeks data are given categorically rather than continuously. Cell means for identical categories in 1981 were calculated and used to impute a continuous measure for each category. In order to ensure full comparability over time, weeks and hours data for years after 1971 were made as coarse as the 1971 data.

Comparable data on other socioeconomic characteristics are limited, primarily because of limitations of the 1971 Census. For instance, only coarse categorical information is available on highest grade attained and years of university, while information on college (non-university) education is unavailable except for whether an individual possesses a trade certificate.

Since information on educational attainment is typically categorical, potential experience is constructed by subtracting off coarse measures of years spent in elementary, secondary, and university education. These coarse measures of years of education were determined by imputing categorical means from the 1976 Census, which has much finer information on educational attainment.

Comparable measures of employment, industry, and occupation (based on "kind of work performed"), given for the main job held in the earnings year for 1971 and for the reference week in later Census years, are made difficult by changes in classification systems. I was able to construct a fairly reliable measure of industry across nine categories for all years. Comparable industry data was obtained by matching the 1980 and 1970 SIC categories industries. According to the 1981 Census a perfect match could be made for the nine coarse groups used except for the "unclassified group" in the 1971 classification scheme, constituting 9 percent of the 1971 data. Those reporting the

unclassified industry were randomly assigned their industry according to the proportions they were found to have in the 1980 SIC according to the 1981 Census. This effect produces a small attenuation bias in the industry variables for 1970, although one that has little importance in the analyses shown.

Another major difficulty presented by changes in the data results from the allowance of multiple responses for questions referring to mother tongue and ethnic origin in later census years. Although multiple responses for having a mother tongue of both English and French are rare (e.g. only 0.4% in 2001), multiple responses on ethnic origin (e.g. British and French) are fairly common and produce serious comparability issues. For this reason, it is more reliable to categorize groups by mother tongue than by ethnic origin, although the two are highly related for Canadian-born residents. Since multiple responses for mother tongue were not allowed for Census years prior to 1986, those who reported both mother tongue, but only a single home language, are assigned the home language as mother tongue. The small percentage remaining (less than 0.3 percent) is allocated mother tongue randomly, which should produce an imperceptibly small downward bias in the Francophone wage gap.

The analysis could have also been carried out in terms of the language spoken at home, although this trait is endogenous to choice and less reflective of education than mother tongue. In practice, home language and mother tongue overlap so much that the effect on the analysis is quite small.

Appendix 2   Controlling for Urban Residence: Comparing Montreal and Toronto

Urban residence is not included in the main analysis as it is not recorded in the national 1971 PUMFI files. A separate file of the residents of Montreal and Toronto Census

Metropolitan Areas (CMAs) is available, making it possible to analyze this population within a framework similar to the one used above, replacing "Quebec" with "Montreal" and "Non-Quebec" with "Toronto." Such an analysis is limited: Montreal and Toronto residents are not fully representative of all Canadians, each city may suffer from idiosyncratic economic shocks, and selective migration in and out of these cities may be correlated with unobserved determinants of wages. Yet, as about three quarters of the Quebec Anglophone population lives in Montreal, compared to only about 40 percent of the Quebec Francophone population, focusing on this urban population helps to control for the residential locations of Francophones and Anglophones. Also, Montreal Anglophones may be more comparable to Toronto Anglophones than Quebec Anglophones are to non-Quebec Anglophones in both observable and unobservable skills. This is reflected in the similarity of their education levels (not shown). Another sign of their comparability is that Anglophones leaving Montreal moved disproportionately to Toronto.

Figure A graphs the total (like Figure 1) and residual (like Figure 3b) wage gaps, using the same β coefficients estimated from all Canadian Anglophones, using only residents of Montreal and Toronto CMA's to calculate the average X characteristics. Most of the patterns are similar to the ones observed before with some notable exceptions. First, the total, as well as the residual, Francophone wage gap across both cities has increased since 1980. For all years, the residual Francophone wage gap within Montreal is roughly 3 points more positive than within Quebec, suggesting that an additional 3 points of the gap within Quebec is related to the greater Anglophone presence in urban Montreal. Through 1985, Anglophones were earning about as much

as in Montreal as in Toronto, controlling for observable characteristics; over the last fifteen years this gap widened to a negative 16 points, more than double the Quebec gap for Anglophones as a whole. This is because wages in Toronto have recently grown faster than in the rest of Canada.

Appendix 3   Wages of Allophones and the Return to Language Skills

Another method to examine the return to language skills is to look at the wages of Allophones, whose mother tongue is neither English nor French, who speak different combinations of French and English (besides other languages), but have similar observable non-language skills. Allophones are largely immigrants, and the composition of immigrants has changed over time. To help mitigate this problem, native-born Allophones are used in the sample here, in the hope that these immigrants are better assimilated and less prone to changes in composition bias.

Figure B graphs the relative wages, both total and residual, of Allophones in various subgroups. From the solid line we see that Canada-wide, Allophone wages have historically been lower than Anglophone wages, although they have converged over time, largely through improvements in observable skills, as the residual differences are much smaller than the total differences. Within Quebec the differences and changes are noisier as relatively few Allophones live in Quebec. However, according to residual wage differences, in 1970 Allophones had wage levels similar to Francophones, and about 14 percent less than Anglophones. Although the intermediate years show a peculiar pattern, by 2000 their wage-levels were similar to that of Anglophones as well as Francophones. Anglophones in Quebec experienced a drop in wages relative to Allophones similar to that of Francophones.

Table A reports the proportions of Allophones of groups defined by location and language skill groups, together with their total, residual, and predicted wage gaps of these groups relative to monolingual Allophones outside Quebec. An additional line also compares Allophones in Quebec to Allophones outside Quebec. The decompositions use the coefficients estimated from all Canadian Anglophones, as before. Unfortunately, these estimates are subject to even more complicated potential biases than those for the return to bilingualism.

In Quebec, Allophones are predominantly and increasingly bilingual, although bilinguals do not appear to earn more than Allophones who speak English only. By 2000, 90 percent of Allophones are bilingual in Quebec, while outside of Quebec very few Allophones speak French. The rate of bilingualism has also increased even while Quebec has taken an increasing share of Canada's Allophones.

In 2000, Allophones in Quebec earn 5 percent less than workers with similar skills outside of Quebec. Statistically, one cannot reject that this was also true in 1970 or that there was zero difference. However, it would appear that wages for Allophones did not fall as precipitously in Quebec as did wages for Anglophones. Other than this insight, the other changes in the residual wage gaps between 1970 and 2000 are so imprecise, that they do not provide much further guidance on changes in the return to language skills.

TABLE A

Wages of Allophones with Different Language Skills

Year	1970	2000	Difference
	(1)	(2)	(3)
Panel A: Proportion of Allophones in Region with Language Skills			
Quebec, French Only	0.147 (0.033)	0.038 (0.007)	-0.108 (0.034)
Quebec, English Only	0.349 (0.042)	0.069 (0.009)	-0.279 (0.041)
Quebec, Bilinguals	0.505 (0.052)	0.892 (0.010)	+0.388 (0.053)
Non-Quebec, Bilinguals	0.024 (0.004)	0.073 (0.004)	+0.049 (0.006)
Panel B: Total Wage Gap			
(vs. Non-Qc, English Only) Quebec, French Only	-0.048 (0.125)	-0.334 (0.088)	-0.286 (0.140)
Quebec, English Only	-0.016 (0.095)	-0.098 (0.070)	-0.082 (0.121)
Quebec, Bilinguals	0.156 (0.079)	-0.025 (0.025)	-0.182 (0.080)
Non-Quebec, Bilinguals	0.208 (0.118)	0.180 (0.031)	-0.028 (0.120)
(Total) Quebec vs. Non-Quebec	0.061 (0.060)	-0.055 (0.023)	-0.117 (0.066)
Panel C: Predicted Wage Gap			
(vs. Non-Qc, English Only) Quebec, French Only	-0.015 (0.087)	-0.116 (0.052)	-0.101 (0.095)
Quebec, English Only	0.066 (0.055)	-0.054 (0.029)	-0.120 (0.056)
Quebec, Bilinguals	0.103 (0.039)	0.020 (0.012)	-0.082 (0.040)
Non-Quebec, Bilinguals	0.181 (0.076)	0.122 (0.018)	-0.059 (0.078)
(Total) Quebec vs. Non-Quebec	0.068 (0.029)	0.001 (0.011)	-0.067 (0.031)
Panel C: Residual Wage Gap			
(vs. Non-Qc, English Only) Quebec, French Only	-0.032 (0.151)	-0.217 (0.071)	-0.185 (0.172)
Quebec, English Only	-0.081 (0.080)	-0.044 (0.071)	+0.038 (0.109)
Quebec, Bilinguals	0.054 (0.068)	-0.046 (0.024)	-0.099 (0.069)
Non-Quebec, Bilinguals	0.027 (0.082)	0.058 (0.026)	+0.031 (0.086)
(Total) Quebec vs. Non-Quebec	-0.007 (0.053)	-0.056 (0.022)	-0.050 (0.057)

For male workers in the wage sample, ages 20 to 59. Based off a similar "wages sample" with all those whose mother tongue is neither French nor English, i.e. "Allophones." The first four rows give the difference Allophones of the group stated and Allophones outside Quebec who speak English only. The last row of each panel gives the difference between all Quebec Allophones and all non-Quebec Allophones. Standard errors based off of 100 iterations. See text for further detail.

TABLE B
Single-Skill Index Model of Hourly Wages

Francophone Wages

Dependent Variable Region	All of Canada				Quebec			
Year	1970		2000		1970		2000	
Specification	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic
Anglophone Wages	0.93	1.06	0.97	0.87	0.78	0.30	0.89	1.11
	(0.05)	(0.16)	(0.02)	(0.09)	(0.07)	(0.31)	(0.04)	(0.21)
Anglophone Wages Squared		-0.10		0.08		0.31		-0.17
		(0.13)		(0.06)		(0.20)		(0.15)
Intercept (at $10)	-0.02	-0.05	0.00	0.02	-0.01	0.15	0.12	0.07
	(0.02)	(0.04)	(0.02)	(0.03)	(0.05)	(0.09)	(0.03)	(0.06)
Goodness-of-fit test	58.1	50.8	149.0	95.7	32.9	31.4	14.0	10.8
p-value	0.02	0.07	0.00	0.00	0.00	0.00	0.23	0.38

Quebec Wages

Dependent Variable Mother Tongue	Anglophone				Anglophones and Francophones			
Year	1970		2000		1970		2000	
Specification	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic
Non-Quebec Wages	0.99	1.36	1.08	0.46	1.06	1.30	1.00	0.08
	(0.09)	(0.50)	(0.07)	(0.17)	(0.05)	(0.12)	(0.03)	(0.10)
Non-Quebec Wages Squared		-0.24		0.45		-0.20		0.13
		(0.31)		(0.13)		(0.08)		(0.07)
Intercept (at $10)	0.12	0.00	-0.14	0.05	-0.06	-0.11	-0.03	0.02
	(0.07)	(0.17)	(0.05)	(0.05)	(0.02)	(0.03)	(0.02)	(0.03)
Goodness-of-fit test	25.1	25.1	25.3	15.5	29.7	28.4	126.1	80.4
p-value	0.01	0.01	0.00	0.00	0.07	0.08	0.00	0.00

Relative wage gradients of different skill groups, for men in the wages sample, ages 20-59. Skill groups obtained by interacting 5 education categories (grade 8 or below, grade 9 or 10, grade 11 and above, some university, and bachelor's degree or higher) with 5 experience categories (0-9, 10-19, 20-30, 30-40, and 40+ years), using groups with only at least 30 observations in each group for all regions and years. Robust standard errors shown. See text for further detail.

FIGURE A

Mean Wage Gaps between Groups: Montreal and Toronto Only

FIGURE A1: Predicted Gap

FIGURE A2: Residual Gap
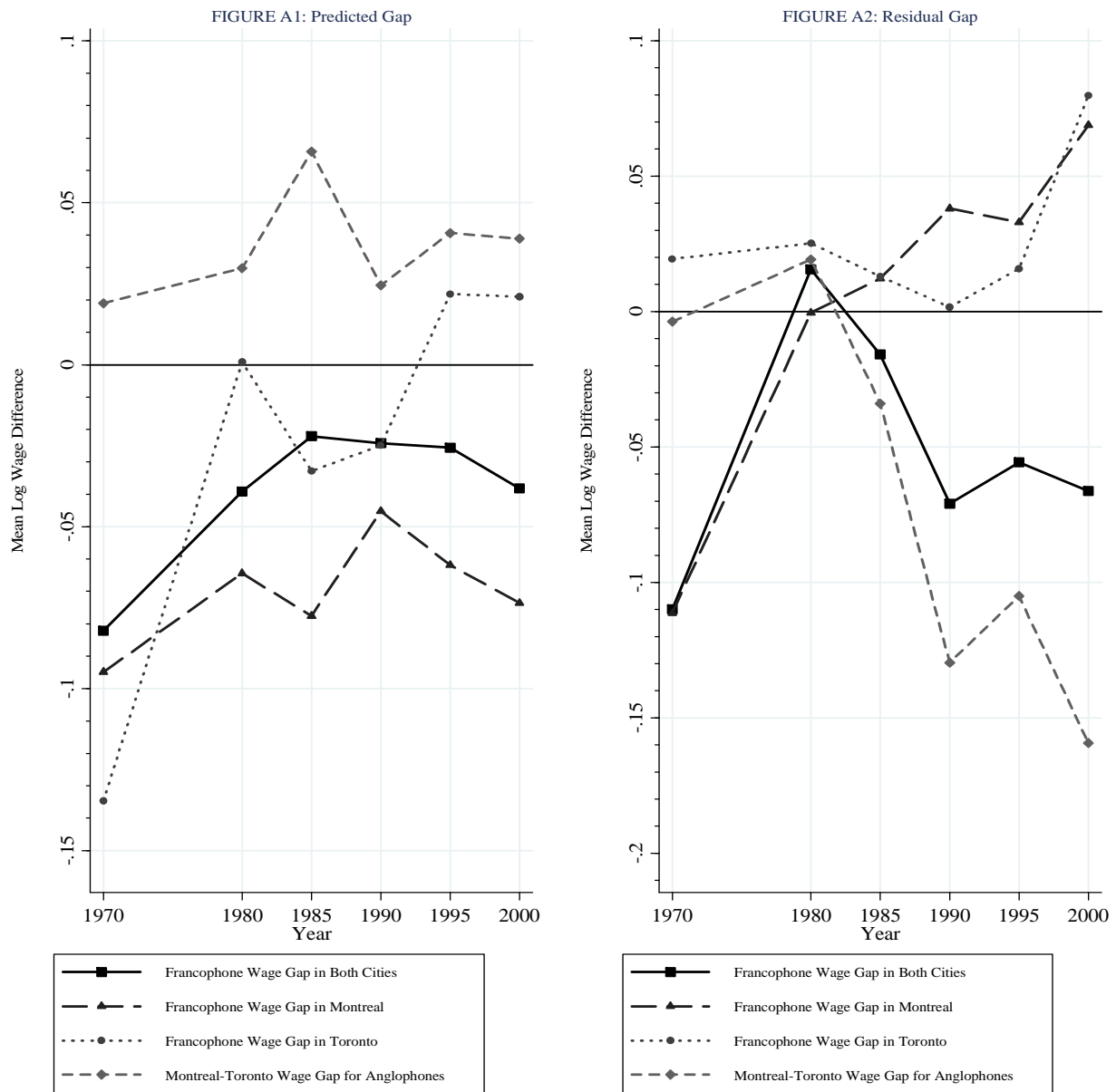
For males in wage sample, ages 20-59. Coefficients estimated from all Anglophones in Montreal and Toronto. See text and Figures 1 and 3 for further details.

FIGURE B

Mean Wage Gaps between Groups using Allophones

FIGURE B1: Total Gap

FIGURE B2: Residual Gap
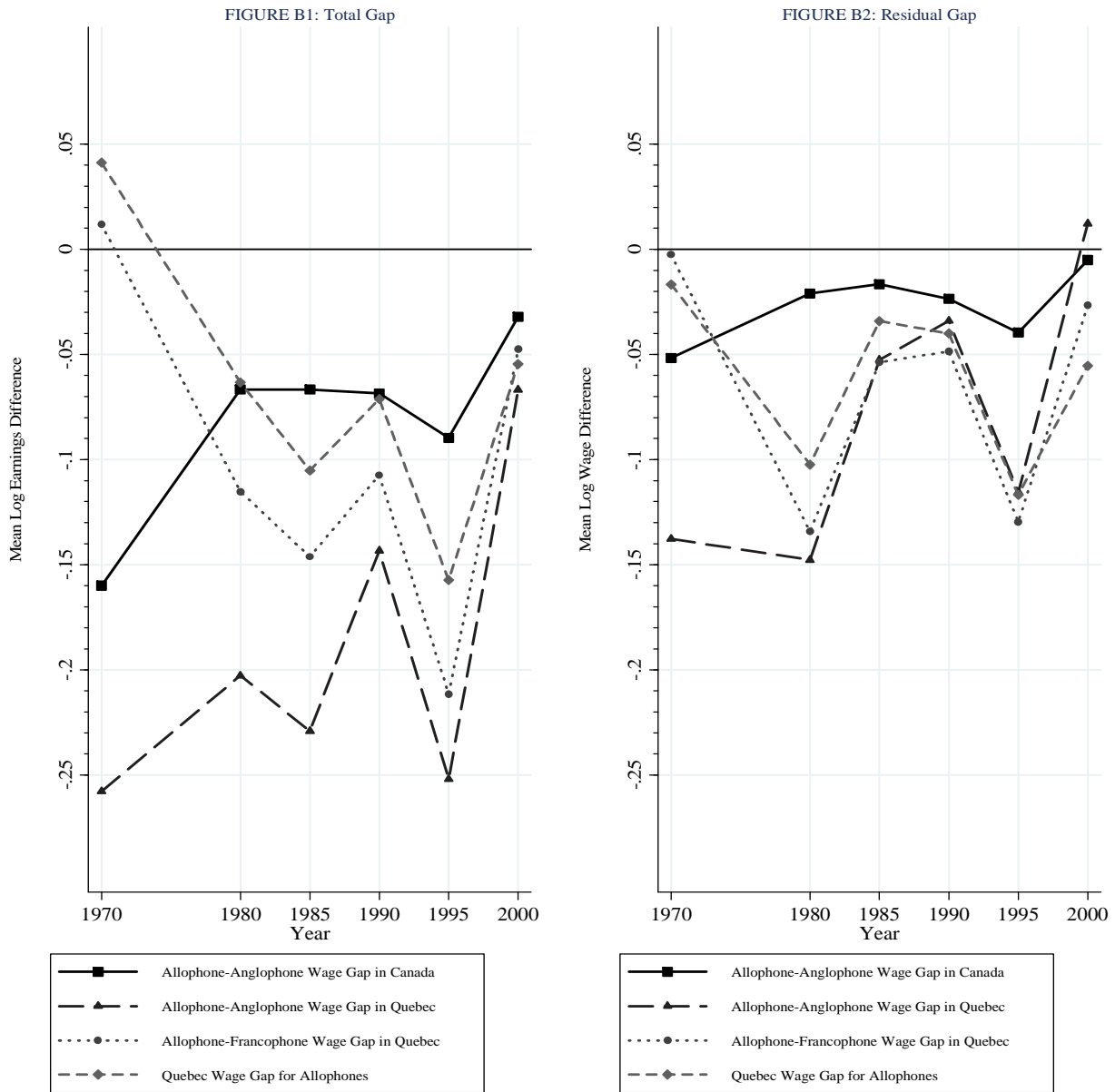
For males in wage sample, ages 20-59. See text and Table A for further details