

The Effect of Literacy on Immigrant Earnings

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Introduction

Immigrant recipient countries devote considerable research effort to understanding earnings differences between immigrant and native-born workers (see Chiswick (1978), Borjas (1985) (1995) for the U.S. case, and Baker and Benjamin (1994), Bloom, Grenier and Gunderson (1995), and Grant (1999) for the Canadian case). These studies clearly establish that, in general, immigrants earn less than native born workers with the same amount of education and work experience. The low earnings of immigrants are often attributed to the specificity of human capital to the country where it originates. Skills generated through education or work experience in the source country cannot be directly transferred to the host country, resulting in apparently well qualified immigrants holding low paying jobs. Of course, this is not the only potential explanation for lower immigrant earnings. Another possibility is that Canadian employers discriminate against immigrants, that is, pay immigrant workers less than equally productive native born workers. Investigating these issues would be straightforward if we had access to direct measures of skill. In that case, we could compare native born and immigrant workers with the same levels of measured education and experience to see whether the immigrants in fact have lower skill levels, supporting the first hypothesis. Alternatively, we could observe whether immigrants get a lower return to their observed skills, supporting the second hypothesis. In this paper, we take advantage of a rich dataset of immigrants from Ontario (the Ontario Immigrant Literacy Survey or OILS) which includes both standard demographic and labour market information and results from literacy and numeracy tests. Interpreting the literacy and numeracy test scores as direct measurements of cognitive skills, we are able to provide a closer examination of explanations for low immigrant earnings than has previously been possible. In addition, the data include more precise information on where education was obtained and age of migration than is available in most previous studies, further refining our ability to scrutinize immigrant-native born earnings differentials.

Our approach builds on a series of recent papers that stress the need to account carefully for where education and experience was acquired in examining immigrant earnings. Using Israeli Census data, Friedberg (2001) finds that lower immigrant earnings compared to native born workers with similar education and experience can be explained almost entirely by lower returns to experience acquired outside of Israel. This is true in particular for non-European immigrants. Similarly, Green and Worswick (2002) find zero returns to foreign experience for recent

immigrant cohorts but show that, in Canada's case, this is a change from the early 1980s when immigrants earned returns to foreign experience that were similar to what the native born were earning for domestically acquired experience. Much of this change over time is related to changes in the source country composition of the inflow. Schaafsma and Sweetman (2001) and Ferrer and Riddell (2003) examine the issue of lower returns to foreign acquired education in a somewhat indirect way by using age at immigration.¹ Both papers note that distinguishing the effects of Canadian acquired experience is important, as the returns to foreign experience are negligible. The returns to foreign education, while lower than those to Canadian education are still substantial. As we stated earlier, the OILS has definite advantages over the data used in these papers because it includes direct measurements of foreign acquired education and experience. Part of the contribution of this paper is to re-examine issues about returns to foreign experience and education raised in earlier papers with better data.

This paper also builds on work by Green and Riddell (2003) which uses the International Adult Literacy Survey (IALS) to examine the role of cognitive skills in Canadian earnings patterns more generally. Like the OILS, the IALS contains both standard survey questions and literacy and numeracy tests. Green and Riddell (2003) argue that the types of literacy questions asked in the IALS are particularly conducive to using the literacy test scores as measures of cognitive skills possessed by the respondent at the time of the survey. Based on this assumption, they argue that much can be learned about how these basic skills influence earnings from an analysis of interactions of the literacy measures and other standard human capital variables. In that analysis they use an hedonic model in which observed earnings are directly determined by the basic skills an individual possesses and the prices of those skills. We adopt a similar interpretative framework in this paper and, in fact, use a sample of native born workers from the IALS data to provide a comparison group for the immigrants observed in OILS.

Alboim et. al. (2003) is in some ways the most similar paper to ours in structure and content. Their study uses data from the 1989 precursor to the IALS called the Literacy Skills Used in Daily Activities (LSUDA) survey that also contains quite complete questions on where experience and education was acquired as well as literacy test results. They provide a careful examination of immigrant earnings in relation to education and experience obtained in Canada

¹ The Canadian Census of Population -- the data used in most previous immigration studies -- has no information about the origin of human capital. In addition, the age of arrival variable is coded at bracketed intervals. This

and abroad. Our paper differs from theirs in a number of key respects. First, while Alboim et. al. (2003) focus mainly on returns to foreign education and experience, using literacy as essentially an extra control, we focus mainly on issues relating to the impact of literacy on earnings. Thus, we view our analysis as more of a complement than a substitute for their paper. Second, the LSUDA is a nationwide survey which does not over-sample immigrants. As a result, Alboim et. al. (2003) have a sample of only 251 immigrants to work with. This precludes detailed examinations of some of the more complex impacts of foreign experience and education on Canadian earnings. In contrast, the OILS focuses only on immigrants, allowing us to work with a sample of over 2600 immigrants. Third, the LSUDA contains information on total annual income rather than earnings. OILS and IALS contain information on annual earnings, which we view as being more closely related to the types of human capital explanations we seek to investigate.

A Framework for Discussing Earnings Generation

In this section we set out a simple framework for considering earnings generation and, in particular, the components of earnings generation that are specific to immigrants. The framework is based on the one used by Green and Riddell (2003) in their discussion of literacy and earnings among non-immigrants. In our discussion, we will distinguish among attributes (personal characteristics that can be acquired by the worker and enhance individual earnings), skills (personal characteristics that aid in productivity in specific tasks and which can be acquired by the worker) and abilities (innate, productive characteristics). In this taxonomy, skills are a subset of attributes, where the former focus on facility with specific tasks while the latter also includes characteristics such as persistence and willingness to follow orders. Abilities are similar characteristics to attributes but are innate while attributes are acquirable.

Assume, for the moment, there are three attributes a worker can possess, and workers can possess them in varying amounts. We begin with three attributes only because it allows us to emphasize key points. We can easily extend the framework to address the more likely scenario that there are more than three. Individual earnings are determined according to some function of the skills an individual possesses and puts into use, as follows:

enormously complicates the imputation of measures of pre- and post-migration experience.

$$E_i = f(G_{1i}, G_{2i}, G_{3i}) + \varepsilon_i \quad (1)$$

where, E_i are earnings for individual i in our sample year, G_{ki} is the amount of attribute k that person i sells in the market, and ε_i is a disturbance term that is independent of the attributes. We think of the disturbance term as capturing either individual idiosyncratic events that are independent of the attribute levels or measurement error in earnings. The earnings generation function $f(\cdot)$ can be viewed in a number of ways. One possibility is to interpret it as derived ultimately from marginal product conditions related to an overall production function that is separable in other (non-skill) inputs. Another, is to see it, at least in part, as representing worker capacities to capture rent shares from firms (e.g., Bowles et al.(2001)). We remain agnostic on which approach to use. In either case, by characterizing the $f(\cdot)$ function, we can learn about the importance of the various attributes and how they interact in earnings generation. To help in focussing ideas, we will think of G^1 as cognitive skills of the type measured in literacy tests, G^2 as other (perhaps manual) attributes that are not captured in such tests and might be acquired through work experience, and G^3 as non-cognitive characteristics such as persistence that might be partly acquired through schooling.

In setting out equation (1), we have in mind an earnings function that is quite general. However, it will prove much easier to work with a more specific functional form. In our empirical investigations, we find that the data is well characterized by first or second order polynomials in observable variables. Thus, for the purposes of obtaining intuition, we work with a rewriting of (1) as²:

$$E_i = \gamma_0 + \gamma_{11}G_{1i} + \gamma_{21}G_{2i} + \gamma_{31}G_{3i} + \gamma_{12}G_{1i}^2 + \gamma_{22}G_{2i}^2 + \gamma_{32}G_{3i}^2 + \delta_{12}G_{1i}G_{2i} + \delta_{13}G_{1i}G_{3i} + \delta_{23}G_{2i}G_{3i} + \varepsilon_i \quad (1')$$

We are interested in characterizing the $f(\cdot)$ function or, in the more restrictive version given in (1'), getting estimates of the γ (and δ) parameters. Once we have done that, we will know the relative importance of the various attributes in earnings generation and also whether the attributes are complements or substitutes in generating earnings.

² We omit higher order interaction terms because they do not enter our specifications.

Characterizing the earnings function would be a relatively straightforward exercise if we observed the skills, G_{ki} . Typically, of course, we do not observe them. What we do observe is some of the inputs used in generating the attributes. To see how they enter our framework, consider a set of attribute production functions:

$$G_{ki} = h_k(edn_i, exp_i, \theta_{ki}) \quad (2)$$

where k indexes the attribute type, edn corresponds to a set of dummy variables representing different levels of formal schooling, exp is years of experience in the work force and θ_k is an ability specific to the production of the k -th attribute. Of course, an h function could be constructed such that an attribute corresponds one for one with an ability (e.g., persistence may be an innate characteristic rather than something that can be produced).

As with the $f(\cdot)$ function, our discussion of the features of the $h_k(\cdot)$ functions is simplified by considering a quadratic version:

$$G_{ki} = \alpha_{ks1} edn_i + \alpha_{ke1} exp_i + \alpha_{ke2} exp_i^2 + \alpha_{k\theta1} \theta_{ki} + \alpha_{k\theta2} \theta_{ki}^2 + \alpha_{ks2} edn_i * exp_i + \alpha_{ks\theta} edn_i * \theta_{ki} + \alpha_{ke\theta} exp_i * \theta_{ki} \quad (2')$$

where the e , s and 2 subscripts on the \forall 's correspond to experience, schooling and ability variables, respectively. Note that edn corresponds to a vector of education dummy variables and thus the \forall 's correspond to either scalar parameters or vectors of parameters as appropriate.

If we do not observe the G_{ki} 's directly, we can obtain an estimating equation by substituting the equations given by (2) into (1). This then yields a reduced form specification for earnings as a function of schooling and experience. The ability variables are unobserved and thus end up in the error term. An inspection of equations (1') and (2') makes it clear that the coefficient on an observable variable such as educational attainment in the reduced form earnings equation will consist of a combination of \forall , $*$ and \forall parameters. For example, the coefficient on the dummy variable for a university degree in the reduced form equation becomes:

$$\gamma_{11} (\alpha_{1s1u} + \alpha_{1s\theta u}) + \gamma_{21} (\alpha_{2s1u} + \alpha_{2s\theta u} \theta_{2i}) + \gamma_{31} (\alpha_{3s1u} + \alpha_{3s\theta u} \theta_{3i}) + \delta_{12} (\alpha_{2s1u} + \alpha_{1s\theta u} \theta_{1i} + \alpha_{1s1u} + \alpha_{2s\theta u} \theta_{2i}) + \delta_{13} (\alpha_{3s1u} + \alpha_{1s\theta u} \theta_{1i} + \alpha_{1s1u} + \alpha_{3s\theta u} \theta_{3i}) \quad (3)$$

where the u subscript on an \forall coefficient indicates the element of the relevant \forall vector corresponding to the university dummy.

There are several points to note from the representative coefficient expression given in (3). First, with only reduced form coefficients to work with, we cannot make clear statements about how attributes are generated or how they combine in earnings generation apart from extreme cases in which a coefficient of zero on an observed covariate implies that a strategic combination of the ζ , $*$ and \forall parameters are zero. Second, the coefficient on an observed covariate such as schooling reflects the combination of how that covariate contributes to production of each of the three attributes and how those attributes contribute to earnings generation. Third, the coefficient is a function of the unobservable \mathcal{Z} 's - the ability measures. This means that some type of random coefficients estimator may be appropriate. As a first pass, we will ignore this latter complication and present results based on mean regression. Given the model set out above, these estimates are not fully efficient and can provide only part of the story of how the various attributes interact. Nonetheless, as we shall see, there is still a great deal we can learn from mean regressions, and they have the advantage of being easy to interpret and compare to the existing literature.

We are interested in how much we can learn about the structure of the functions in equations (1) and (2) when we observe one of the attributes. Labelling the observed attribute, G_i , and using it to refer to cognitive skills, we will get a quasi-reduced form earnings regression that includes G_i (the literacy score variable), experience and schooling variables.

Our general estimating regression corresponding to the quasi-reduced form function including G_i is of the form:

$$E_i = \beta_0 + \beta_1 \text{edn}_i + \beta_2 \text{exp}_i + \beta_3 \text{exp}2_i + \beta_4 \text{edn}_i * \text{exp}_i + \beta_5 G_{1i} + \beta_6 G_{1i}^2 + \beta_7 G_{1i}^3 + \beta_8 G_{1i} * \text{edn}_i + \beta_9 G_{1i} * \text{exp}_i + u_i \quad (4)$$

where G_{1i} corresponds to our measure of literacy, edn is again a vector of education dummy variables, the β 's are either scalars or vectors of parameters as appropriate and u is an error. Notice that the error term will include interactions of the ability variables and the observables.

The framework as set out to this point could be considered the relevant earnings generation model for a native born individual. Earnings generation for immigrants can be seen within the same general framework. That is, immigrants use the same sets of attributes to generate earnings in the Canadian labour market. Immigrants could differ from the native born in both of the main building blocks of the model: in the returns they obtain from a given set of attributes (i.e., immigrants could have a different $f(\cdot)$ function); and in the production functions for creating individual attributes (i.e., immigrants could have different $h(\cdot)$ functions).

Differences in the $f(\cdot)$ function between immigrants and the native born correspond to discrimination in this model since they represent differences in earnings between two individuals (an immigrant and a native born worker) who are in fact identically productive (they have identical levels of the productive attributes). Thus, if we could directly observe all relevant attributes, we could determine whether shortfalls in earnings for immigrants relative to the native born arose due to discrimination. It is tempting to think that differences between immigrants and the native born in the coefficients on the non-interacted G_{1i} terms (i.e., \exists_5 , \exists_6 , and \exists_7) can provide direct evidence on whether discrimination exists (i.e., on whether immigrant and native born workers with the exact same observed literacy skills are paid differently). However, if interactions of G_{1i} with the exp and edn variables turn out to be significant then this interpretation need not hold. A non-zero interaction of, for example, exp and G_{1i} would imply both that the $f(\cdot)$ function involves an interaction of G_{1i} and some other attribute (say, G_{2i}) and that exp helps to produce G_{2i} . In that case, the return to G_{1i} is a complicated function that varies with different levels of exp and the direct coefficients (\exists_5 , \exists_6 , and \exists_7) just represent the effect of G_{1i} on earnings at the base level for experience. In that case, one could observe different coefficients related to G_{1i} between immigrants and the native born because exp is differentially productive in creating other attributes for the two groups rather than because of discrimination. Intuitively, if literacy somehow interacts with experience-generated skills in determining earnings then we could see different returns to literacy between immigrants and the native born because of differences in how productive their experience is rather than because employers are paying immigrants less for the same literacy skills. Thus, the coefficients \exists_5 , \exists_6 , and \exists_7 will provide general information about discrimination only if the coefficients on the interactions of G_{1i} and other variables (i.e., \exists_8 and \exists_9) are zero.

Given results in earlier research both in Canada and in other countries, it seems very likely that the attribute production functions are different between immigrants and the native born. Thus, for immigrants, we might want to rewrite these production functions as:

$$G_{ki} = h_k^l(edn_i, exp_i, \theta_{ki}, fedn_i, fexp_i) \quad (2)$$

where *edn* and *exp* correspond to education and experience obtained in Canada, while *fedn* and *fexp* represent education and experience obtained in the source country. A standard claim in the immigrant assimilation literature is that credentials recognition problems and pure mismatch in technological requirements imply that education and experience obtained in most other countries will not be as productive in Canada as education and experience obtained here. If this is not true, then equation (5) collapses to equation (2) and the only reason for differences in earnings between immigrants and the native born is that they either have different levels of schooling, experience and ability or that there is discrimination. Often, studies do not have particularly good measures of *fedn* and *fexp* so it is difficult to check directly for differences in returns on these attribute inputs. However, the OILS data contains direct questions on education obtained abroad and permits calculation of age at arrival as a continuous variable. This means we can construct reliable versions of both *fedn* and *fexp*. With these in hand, the immigrant earnings specification, with G_{li} included, becomes:

$$\begin{aligned} E_i = & \beta^l_0 + \beta^l_1 edn_i + \beta^l_2 exp_i + \beta^l_3 exp_i^2 + \beta^l_4 edn_i * exp_i + \beta^l_5 G_{li} + \beta^l_6 G_{li}^2 \\ & + \beta^l_7 G_{li}^3 + \beta^l_8 G_{li} * edn_i + \beta^l_9 G_{li} * exp_i + \beta^l_{10} fedn_i + \beta^l_{11} fexp_i \\ & + \beta^l_{12} G_{li} * fedn_i + \beta^l_{13} G_{li} * fedn_i + \beta^l_{14} fexp_i * fexp_i + \beta^l_{15} exp_i * fexp_i + u_i \end{aligned} \quad (6)$$

We have written equation (6) to include a wide variety of interactions of *fexp* and *fedn* with each other and other variables³. Thus, the specification allows for complex interactions among foreign obtained attribute inputs in the production of attributes. For example, the interaction of *fexp* and *exp* represents that possibility that immigrants are better able to translate their source country experience into earnings after they have more experience in Canada.

³ We have, however, left out further interactions of Canadian obtained education with source country variables since they turn out not to be important in our empirical analysis.

A key conclusion of the previous literature on immigrant earnings in both Canada and the U.S. is that more recent cohorts of immigrants have poorer earnings when compared to both earlier immigrants and native born workers with the same measured levels of education and experience. In our framework, that would arise either because of an increase in discrimination against more recent cohorts (because they have a larger visible minority component) or because more recent cohorts do not have as high levels of the attributes. The latter could occur because recent cohorts are inherently less able (i.e., have lower average values of \mathcal{Z}) or because their pre-arrival experience and education are not as useful in producing Canadian relevant attributes as were those of previous cohorts. Their pre-arrival inputs might be less useful if the source country composition has switched toward countries with labour markets and educational institutions that are more dissimilar to those in Canada. With a single cross-section of data, we cannot separate effects of changes across immigrant cohorts from the effects of gradual adaptation to the Canadian labour market by new immigrants. The Canadian experience coefficients we estimate for immigrants will effectively combine true assimilation (ie. Canadian experience) effects and the impact of differences across cohorts on earnings. Although this means we cannot decompose this feature of immigrant adaptation, we are still able to learn much about the immigrant experience and how it relates to measured literacy.

Literacy plays an important role in this analysis. As stated earlier, we assume that the literacy score measures actually permit direct measurement of a skill and that, given that direct measurement, we can then examine G_{li} and its interactions to learn about the role of various attributes in earnings generation. In equation (6), the interactions of literacy with $fexp$ and $fedn$ are of special importance. Nonzero coefficients on these interactions may reflect impacts of literacy in helping immigrants translate their foreign obtained human capital into the Canadian labour market. Note that in our framework, such an effect would amount to improved literacy leading to more production of G_{2i} and G_{3i} with given levels of $fexp$ and $fedn$ and would be captured by including G_{li} in the G_{2i} and G_{3i} attribute production functions.

To this point we have not mentioned a key component of the immigrant assimilation experience: language skills. In our framework, employers care only about the usable amounts of each attribute a worker possesses. Thus, an engineer who is well trained but cannot communicate with his or her employer or fellow employees would be counted as having zero usable engineering skills. Language ability in French or English then enters as an input into the

production of usable attributes, with more ability leading to higher usable attributes for any given level of other inputs. Untangling the effects of literacy and language skills among immigrants is clearly very difficult. Since the literacy tests we use were implemented in English or French, immigrants who cannot speak either will get low literacy scores even if their literacy level in their native language is high. This, again, fits with our notion of “usable” literacy skills: an immigrant with high literacy skills when tested in their native language but low literacy in English or French can be viewed as having low “effective” literacy in the Canadian labour market. When we then ask whether higher literacy, as measured in these tests, affects the transmission of foreign education and experience to the Canadian economy, it is hard to know whether we are observing the effects of literacy or of language proficiency since we can’t observe high scores for the former without high levels of the latter. This is especially true because survey questions on language proficiency (including in our case) are usually self-reported and thus not high quality. Moreover, even if we could assess language proficiency directly, it is hard to know how one would separate it from literacy since proficiency in expressing complex thoughts in English (language ability) would only be possible if the individual could process complex thoughts in English (literacy). Thus, while we will control for self-reported language ability, it is not really possible for us to separate language from literacy effects and in places we will argue that some of the literacy tests may in fact be capturing language skills. Nonetheless, as we discuss below, we believe that some of the test scores (particularly, those related to quantitative skills) remain useful for investigating the role of cognitive skills.

As Green and Riddell (2003) discuss, a key shortcoming of the IALS data (which carries over to the OILS data) is the lack of useful instruments to address potential biases arising from correlations between G_{1i} and edn_i and unobserved ability terms residing in the error term in (4). The data contain potential instruments but the data set is too small to allow meaningful implementation of such instruments. For example, IALS includes questions that reveal where the individual took their primary and secondary education (which we might use to capture differences in access to higher education). However, to use this as an instrument we would want to control for where the individuals live currently so that the identifying variation is generated from people who currently live in the same place but grew up in areas with differential access to education. In the end, we decided that we simply do not have enough useful variation to

implement instrumental variables estimators. We return to discussing the conditions under which our estimates bear a causal interpretation below. However, it is worth noting that in our framework, the literacy measure effectively captures differences in cognitive abilities across individuals. Many earlier papers address the standard endogeneity problem inherent in studying returns to education by introducing measures of cognitive ability. Thus, our approach is no worse than those papers.

Data and Basic Patterns

The main dataset we use in this investigation is the Ontario Immigrant Literacy Survey (OILS). Statistics Canada carried out this survey in 1998 to study the language and literacy skills of Ontario immigrants. We also use the 1994 Canadian version of the International Adult literacy Survey (IALS) to provide a comparison between immigrants and the native born. Both data sets are comparable and provide information on individuals' use of language skills, the results of a literacy/numeracy test, as well as information on labour market variables such as income, education and labour force status. The OILS, as its name suggests, contains only immigrants from Ontario and, in fact, only from urban areas in Ontario. To match this data exactly, we could use an IALS sub-sample containing only native born workers from urban areas in Ontario. However, this yields too small a native born sample and, instead, we use a sample of native born workers from urban areas throughout Canada. We include provincial dummy variables in all our estimation to control for cross-province differences in earnings among the native born.

We keep only individuals who have positive earnings and whose age is between 16 and 65, and drop observations when we do not have information on earnings, age at arrival or education. We examine outcomes for males and females separately. Our combined native born (i.e., IALS based) and immigrant (i.e., OILS based) samples are 2015 for males and x for females. Both surveys are based on the Labour Force Survey (LFS) sample frame and we use the sample weights in our analysis.

Our dependent variable is annual earnings. Both the IALS and OILS contain data on weeks worked and usual hours per week, raising the possibility of constructing hourly wage measures. However, the weeks, hours and annual earnings questions do not refer to the same period, so we do not have confidence in weekly or hourly wage measures constructed from the information on weeks and hours of work. Because the OILS and IALS data were collected four

years apart, we adjust the earnings data from the IALS using the CPI to put it in comparable dollars to that recorded in the OILS. Of course, it is still the case that native born and immigrant earnings could differ in our data simply because 1994 and 1998 represent quite different conditions in the Canadian labour market. Comparisons with estimates obtained from 1996 Census data, presented below, suggest that this problem is not substantial.

Finally, it is worth discussing some of the variables that make the OILS and IALS most special and suitable for our investigations. Both datasets provide measures of Document and Quantitative literacy.⁴ In each case the test questions do not attempt to measure abilities in mathematics and reading but try to assess capabilities in applying skills to problem-solving in everyday life. Thus, the Document questions, which are intended to assess capabilities to locate and use information in various forms, range from identifying percentages in categories in a pictorial graph to assessing an average price by combining several pieces of information. The Quantitative component ranges from simple addition of pieces of information on an order form to calculating the percentage of calories coming from fat in a Big Mac based on a nutritional table. Thus, the questions are related to problem-solving and implementation of skills in the real world and are intended not just to elicit abilities in answering current questions but adaptability to answering further questions in other contexts (Statistics Canada, 1996). This is an important point for the interpretation of our results. It is worth emphasizing that these skills are essentially cognitive in nature.

Green and Riddell (2003) find that the individual document and quantitative literacy scores are highly correlated in their IALS sample, with a raw correlation of over 0.9. Due to multi-collinearity problems arising from this, they work solely with a simple average of the literacy scores for each individual. In our data, both the native born and immigrants who obtained their highest level of education before arriving in Canada exhibit correlations on the order of 0.87 between their document and quantitative scores.⁵ However, the correlation for immigrants who obtain their highest level of education in Canada is only 0.67. This raises the possibility of separating different types of literacy effects, at least for the latter group. We

⁴ The IALS also includes measurements of a third literacy domain (Prose) but since the OILS does not include these questions we focus only on Document and Quantitative scores.

⁵ The differences in the correlation for our native born sample relative to that reported in Green and Riddell (2003) likely arises because of the different sample selection criteria used in each case. Green and Riddell (2003) focus only on full year full time workers whereas we use all individuals with positive earnings. This difference will also affect other comparisons between the papers.

present results using both an average literacy score and using separate document and quantitative scores.

The other main variables in our analysis are standard human capital measures plus variables related to language ability in English or French. Our experience variable is constructed as the standard Mincer measure of potential experience (i.e., as age – years of schooling – 6). Since we know the age at which immigrants entered Canada, we are able to divide immigrant experience into two components: foreign experience (age at arrival – years of schooling – 6) and Canadian experience (age – age at arrival). We examine educational impacts using a series of dummy variables corresponding to high school graduates, post-secondary graduates, and those with a BA or higher university degree. The omitted category contains individuals with less than completed high school education. Note that individuals who attend post-secondary institutions but have not graduated are classified as high school graduates if they have in fact graduated from high school. As mentioned earlier, a major advantage of the OILS data is its detailed questions on where the immigrant obtained his or her highest level of education. Thus, we can observe whether individuals, for example, completed high school abroad and then obtained a post-secondary degree in Canada. We make extensive use of this feature in what follows. In particular, we divide much of our analysis between immigrants who completed their education in Canada versus those who completed it abroad. This turns out to be an important distinction and is one that cannot be made very precisely in other data such as the Census.⁶

The survey also includes a series of questions on language ability in English or French, all of which are self-reported. We use one that asks the respondent how well s/he can express her/himself in English or French. We create a dummy variable corresponding to either of the two lowest categories: not at all or poorly. Finally, we include dummy variables corresponding to the country of origin. One variable corresponds to immigrants from the U.S. or U.K. while the other corresponds to immigrants from continental Europe. Much of the earlier literature on immigrants indicates that there are strong source country effects and that immigrants from the U.S. and U.K. adapt particularly well to the Canadian economy. We also tried further dividing the rest of the world but found no significant differences among immigrants from other regions.

⁶ There are some ties in the data (e.g., individuals who record obtaining a post-secondary degree both in Canada and abroad). We treat ties as corresponding to completing education in Canada.

Table 1 displays mean values of the main variables in the data for male and female immigrants and native born Canadians. Immigrants are, on average, 5 years older than the native born, which translates into experience differentials of 4 and 6 years for males and females, respectively. Among men, the immigrant distribution of formal education is superior to that for the native born. The fraction of native-born males with no post secondary education is 66%, versus 49% among male immigrants. Additionally, a larger fraction of immigrant males has a university degree (29%) compared to native born Canadians (14%). Among women the distribution of formal education is much more similar, though among immigrants a larger proportion has not graduated from high school.

This apparent advantage in observable skills does not translate into higher income. Annual earnings are very similar for both native born and immigrant males and noticeably lower for female immigrants. A plausible explanation for this puzzle could be that the Canadian labour market places a different value on the experience and education of immigrant workers.⁷ Note that if we distinguish between the foreign and Canadian components of the experience and education variables, the "immigrant advantage" vanishes to some extent. For instance, the amount of Canadian experience of male immigrants (16 years) is less than the experience of native-born male workers (19 years). Additionally, around 40% of the post secondary educational degrees held by immigrants are obtained in Canada. The literacy and numeracy scores also reveal substantial differences between immigrants and non-immigrants. The average literacy and numeracy scores are higher for the native born. Among immigrants, however, numeracy scores are higher than literacy scores, while the opposite holds for Canadians. Regarding gender differences in literacy scores, male immigrants perform better than female immigrants, whereas Canadian females have higher scores than Canadian males.

In order to assess the extent to which our sample is representative of the Ontario population, Table 1 also shows similar tabulations for a sample drawn for urban Ontario from the 1996 Census. Most of the mean values (earnings, experience, years of education and years since migration) are similar in both samples. The distribution of degrees, however, is different across the samples. The Census sample consistently shows a higher fraction of individuals reporting their highest level of education as post-secondary, and a lower fraction reporting high school, than does the OILS/IALS sample. This is probably due to the differences in the education

⁷ The literature on immigrant earnings assimilation has long recognized this fact.

questions in the two surveys. There are also discrepancies in the reported number of hours of work per week, and the reported number of weeks of work per year, which are higher in the OILS/IALS sample. Once again, the reason seems to be differences in the two questionnaires regarding these variables.⁸ As we will see below, these differences do not imply important differences in earnings regression estimates using the two datasets.

Figure 1(a) plots the kernel density function of the individual averages of the document and literacy scores. The immigrant distribution is bi-modal with a main mode near the mode in the native born distribution and a smaller, though still substantial mode, near the bottom of the distribution. The smoothing inherent in the kernel estimator makes it appear that there is mass across a range of scores near the second mode. In fact, this is capturing the fact that there are 298 immigrant respondents who all share the lowest score in the sample: 83. This score corresponds to the assigned score for individuals who lacked the language skills to answer the test.⁹ Figure 1b plots the average literacy distributions with the respondents who are assigned the lowest score removed. The immigrant literacy distribution now appears more similar, though still inferior to, the native born distribution.

The group of immigrants who could not complete the literacy test is interesting in its own right. One might assume that it consists of recent immigrants who have not yet acquired English or French language skills. In fact it is a mixed group in terms of years since arrival in Canada, with a predominance of immigrants from Southern Europe (Italian and Portuguese) who have been in Canada for over 20 years. However, there is also a significant minority from Asian source countries who have been in Canada for much shorter periods. Not surprisingly, the education and host country language skills of this group are not strong. They have, on average, six fewer years of education than the other immigrants and about one-half of them report not being able to carry out a conversation in English. What is surprising is that their average earnings (\$29,892) are not far below from those of native born workers. Being able to last so long without learning English or French while still obtaining reasonable earnings levels is suggestive of the existence of immigrant enclaves, where they found jobs that do not require language or literacy skills. Only 30% of these immigrants report using English at work, whereas

⁸ The census asks about the number of hours worked in the previous week and the number of weeks worked during the previous calendar year, whereas the OILS/IALS asks about usual hours worked during the previous year and the number of weeks worked during the last 12 months.

⁹ The assigned score for the quantitative test is 108, and for the document score it is 57.

60% of the males (40% of the females) report that they do not use literacy skills at work. These jobs are mainly in the service sector, construction and manufacturing. Table 1A in the appendix shows the average characteristics of this particular group of immigrants.

An interesting fact arising from Table 1 is the substantial fraction of immigrants who acquire their education in Canada. Although researchers have recognized the importance of controlling for where education is obtained (foreign or domestic) when studying immigrant earnings, hardly any data set possesses this information. Indirect controls, like age at immigration, are not satisfactory, particularly when this variable is only available in coded intervals. We take advantage of the information in the OILS, which specifically asks about the level of education at the time of migration, to investigate the importance of the origin of education. Table 2 separates immigrants between those who report obtaining their highest degree in Canada and those who did not acquire any education in Canada. It is immediately apparent that these two groups have very different experiences in the Canadian labour market. Male immigrants with Canadian education earn 32% more than immigrants with no Canadian education and 18% more than native-born workers. Note that these immigrants are observationally very similar to Canadian workers. Their skills are comparable to those of Canadians both regarding experience and the content of their formal education. The average literacy and numeracy score of this group is also very close to that of Canadians. On the other hand, the average male immigrant with no Canadian education has earnings that are 90% of those of the average native born worker, less Canadian experience (although more total experience), and much lower numeracy and literacy scores. The same types of patterns are observed for females. These findings confirm that controlling for the origin of education may indeed be key to understanding immigrant earnings.

Figure 2 shows the distribution of literacy scores (after removing the group assigned the minimum score) for immigrants with and without Canadian education (Figures 2a and 2b respectively) relative to that of the native born. Somewhat surprisingly, the distribution of literacy scores for immigrants who completed their education abroad appears more similar to that of the native born than the distribution for immigrants who completed their education in Canada. The latter distribution has a larger concentration to the left of the mode in the native born distribution. This indicates that the lower average scores for immigrants educated abroad seen in Table 2 arise mainly because a disproportionate number of the immigrants who could not

complete the test (and who are not included in the distributions in Figure 2) completed their education abroad.

A further investigation of differences in literacy is provided in Figures 3 and 4. Figure 3a recreates Figure 1a for document literacy scores only. Again, there is clear bimodality in the immigrant sample driven by the set of respondents who are unable to answer the literacy questions. The distributions are redrawn in Figure 3b after removal of these observations with assigned literacy scores. The immigrant distribution is clearly inferior to that of the native born. Figures 3c and 3d recreate this comparison but for the immigrant sub-samples corresponding to immigrants who obtained their education after arrival and immigrants who obtained their education before arrival, respectively. As with overall literacy, we see that both immigrant groups have inferior distributions but that the distribution for immigrants educated in Canada seems particularly poor. Figures 4 reproduce this set of distributions but for quantitative literacy. In striking contrast to the results for document literacy, the quantitative literacy distributions for both sets of immigrants are very similar to the native born distribution. This may make sense since one would expect quantitative literacy to be less language dependent. Indeed, it is possible that document literacy scores are as much language tests as tests of cognitive skills.

Understanding the relationship between literacy and human capital variables like education or experience is central to our analysis. Table 3 reports the results from a regression of the literacy score on these variables plus additional control variables such as language ability and province of residence (not reported). These regressions do not include observations on the individuals who were incapable of answering the literacy test since we examined them separately earlier. For native born males, the estimated coefficients reported in the table indicate that there is essentially no difference in average literacy levels among individuals with different years of experience. Green and Riddell (2003) find that this is a very robust result across various specifications in the IALS data that is predominantly made up of native born workers. Labour market experience does not appear to exert a net impact on literacy. For native born females, there is a statistically significant relationship between experience and literacy but the effect is not economically substantial. A female worker with 20 years of experience has an average literacy score that is just 5 points higher than a similar worker just entering the labour force. On the other hand, there is a strong relationship between education and literacy for the native born. Native born university graduates of both genders have average literacy scores that are over 70 points

higher than workers who have not completed high school. Given that the overall average score is just under 300, this is a very sizeable difference. University graduates also have dramatically higher literacy than graduates from other post-secondary institutions, particularly for males.

For ease of interpretation, the experience and education variables used in the Table 3 estimation are defined in such a way that the immigrant coefficients stand on their own; that is, they are not defined relative to the native born coefficients. The results for immigrants are somewhat mixed. For both male and female immigrants, foreign experience does not have a statistically significant relationship with literacy, mirroring the results for Canadian experience among the native born. On the other hand, male immigrants who finish their education in Canada exhibit a relatively substantial relationship between Canadian experience and literacy, with an immigrant who has 20 years of Canadian experience having a literacy score that is 34 points higher on average than an immigrant just entering the Canadian labour force. Male immigrants educated abroad also have a positive relationship between Canadian experience and literacy, though the effect is not statistically significant and the size of its impact is only about one third of that for Canadian educated immigrants at the 20 years of experience point. For females educated in Canada there is essentially no relationship between Canadian experience and literacy levels. For females educated abroad, the impact of Canadian experience is actually significantly negative. That there is some relationship between Canadian experience and literacy for immigrants even though there is none for the native born is not surprising if the literacy tests are partly picking up language abilities. However, it is impossible to tell whether Canadian experience is capturing a true experience effect or differences across immigrant cohorts. There is no such confusion with foreign experience, however, and the results there are the same as with Canadian experience for the native born.

Male immigrants who have not completed high school have average literacy scores on the order of 50 points below their Canadian counterparts with the same education regardless of where they finished their schooling. In contrast, the literacy scores of female immigrants with the lowest level of education are not significantly different from their native born counterparts. For male immigrants who obtained their education abroad, there is no difference in average literacy score between high school graduates and drop outs, which is in strong contrast to the outcome for the native born. On the other hand, relative to high school dropouts both the post-secondary and university literacy differentials are of similar size to those observed for the native born for

males. For females, high school provides the same “return” in terms of literacy as for the native born but the university differential is much smaller. Thus, there is no consistent evidence that foreign education generates lower levels of literacy.

What do these results tell us about the relative quality of foreign education? For foreign-educated males, the literacy score differential between high school dropouts and university graduates is of the same order of magnitude as observed for the native born. However, the base group (high school dropouts) has an average score that is over 50 points lower than the native born base group. Thus, foreign-educated immigrants with a university degree have an average literacy score that is approximately 60 points lower than that for a university-educated native born worker. Similarly, the average literacy score for a foreign educated immigrant with a post-secondary degree is about 52 points lower than that for a comparable native born worker. Among women, the differentials are smaller. A foreign-educated female immigrant with a university degree has an average literacy score that is 28 points lower than a university-educated native born woman. The differential for post-secondary women is 17 points. Do these results suggest a failure of foreign higher education in generating literacy skills? If we looked at foreign-educated immigrants alone, the answer might be a qualified yes. For both males and females, the relative disadvantage of immigrants compared to the native born is greater at university than at other education levels. However, average literacy score levels are as low or lower for immigrants who complete their education in Canada and that disadvantage is larger at higher education levels. Thus, the lower literacy levels among immigrants overall and their tendency to fall further behind at higher education levels appears to be more a function of immigrants themselves rather than foreign institutions. Notice that in obtaining these results we control for region of origin and that immigrants from the U.S. or U.K. do not face as large a literacy disadvantage among men and actually have superior literacy scores relative to the native born among women. Combining this with the earlier result that immigrants and the native born differ in document literacy rather than quantitative literacy, a more reasonable conclusion might be that the document literacy score is picking up something language skills for immigrants, that immigrants not from the U.S. or U.K. have some difficulties in English or French, and that any language difficulties accentuate differences relative to the native born to a greater extent at higher than lower education levels.

The effect of education and literacy on immigrant earnings

Males Without Literacy Variables

In this section, we examine results from earnings regressions with and without controlling for literacy. The dependent variable in all our estimations is the log of annual earnings, which, as we discussed earlier, is the only reliable earnings concept in the OILS data. As a first step, we estimate standard cross-section regressions using both Census data and our combination of OILS and IALS data. A comparison of the results with the different datasets will enable us to see if the OILS data is similar enough to the data most commonly used in immigration research to permit some generalization of conclusions. We estimate a specification which includes a quadratic in experience, the education dummy variables specified earlier, a dummy for immigrant status, a quadratic in years since entering Canada for immigrants, and dummy variables corresponding to English or French language proficiency. The Census and the OILS surveys do not contain the same language proficiency questions. In the Census based estimates, we include a set of language controls including whether English or French was the first language spoken and whether the individual speaks English or French at home.¹⁰ In the OILS, we use a question asking how well the individual can express him or herself in English or French. We construct a dummy variable corresponding to the categories, “not at all” and “poorly”.

This specification assumes that returns to both education and experience are the same regardless of where they are acquired and by whom, i.e., for education and experience acquired in the source country by immigrants and acquired in Canada by both immigrants and the native born. Immigrants are assumed to go through a pattern of “assimilation” to the Canadian labour market represented by the immigrant dummy variable (which captures how far ahead or behind immigrants are relative to comparable native born workers just after arrival in Canada) and the quadratic in years since migration. Otherwise, their earnings are assumed to be generated by the same human capital generation and earnings generation functions as the native born.

The first column in Table 4 presents the results based on a sample of immigrant and native born male workers resident in Ontario from the 1996 Census. The results reflect commonly observed patterns. In particular, there is a quadratic in returns to experience with

¹⁰ Rather than including the coefficients from all of these variables in the table, we just include a “yes” in the language expression row to indicate that we did control for self-reported language skills in the Census runs.

returns being near 9% just after school leaving but declining to zero by 30 years later. There are also strong returns to education that are on the order of those found in earlier studies. Immigrants receive annual earnings that are over 60% less than those for native born workers with the same level of total experience and education. Immigrant earnings then rise at a rate of approximately 3% more per year compared to similar native born workers in the years just after the immigrant enters Canada. As indicated by the negative coefficient on the years-since-migration variable (YSM), this rate of catch-up to the native born diminishes over time. If immigrant earnings actually follow this "years since migration" profile then their earnings would equal those of a comparable native born worker at approximately 28 years after in Canada. This, however, is a big "if". As Borjas (1985) points out, if immigrants arriving in different years (i.e., in different cohorts) face different entry earnings and/or years since migration earnings profiles then a cross-sectional years since migration profile will represent a combination of actual profiles and the effects of shifts across cohorts. Thus, the cross-sectional profile is not necessarily the relevant earnings assimilation profile for any set of immigrants. In our case, since there is only a single cross-section of OILS data, there is no way to address this problem. We view the immigrant dummy variable and years since migration profile as summarizing a combination of cohort effects and assimilation profiles rather than as a profile that bears behavioural interpretation. Since our interest centres on literacy effects rather than cohort patterns, we do not view this as a central concern. It is only important for us that we can control for the combination of cohort and assimilation effects, not that we be able to separately identify them.

The second column of Table 4 repeats the estimation of the basic regression using the OILS/IALS data. Because of sample size considerations with the IALS, we include native born workers from all of Canada in our comparison sample and then include provincial dummy variables (not reported in the Table) in our regression.¹¹ The key point for our purposes is the very strong similarity with the Census based estimates. This is particularly true for the immigrant

¹¹ Recall, though, that to match the OILS data, we keep only IALS sample members who are not resident in rural areas

and years since migration effects but also holds for the returns to experience profile. The return to completing high school is substantially lower in the OILS data than what we find in the Census but the returns to each of the higher education levels (relative to graduating high school) are very similar. Our conclusion from Table 2 is that our data provides estimates that are representative of the Ontario population and thus, conclusions with respect to the unique variables in our data (literacy, among others) are potentially generalizable.

The basic specification in column 2 imposes equal returns to education and experience for immigrants and the native born but allows immigrants to have a separate earnings level and an earnings progression with years since arrival. However, the latter YSM effects can be difficult to interpret even in the absence of the cohort effect complication just described. For individuals arriving in Canada after they have completed their education, YSM corresponds to experience in the Canadian labour market. For individuals completing their education in Canada, YSM will equal years of experience in the Canadian labour market plus the number of years between arrival and entering the labour market. Since the latter years may include time when the migrant is quite young, it is not clear one expects them to have a direct impact on a labour market outcome such as earnings. For that reason, we implement an adjusted specification (reported in column 3) in which we allow the immigrant effects and Canadian experience effects to differ between immigrants who arrive after completing their education and immigrants who complete their education in Canada. To the extent there is a difference between these two groups of immigrants in terms of the coefficients on Canadian experience variables, this could represent either differential returns to experience or differential cohort effects or some combination.

In dividing immigrants in this way, we take advantage of a unique feature of the OILS data. Respondents in the OILS are asked about the highest level of education they received outside Canada as well as the highest level obtained in Canada. Previous studies have shown that age at arrival influences immigrant earnings patterns (e.g., Schaffsma and Sweetman, 2001) and often conjecture that better outcomes for those arriving at young ages arise because these immigrants obtain their higher education in Canada. However, this conjecture cannot be directly

verified in most studies because they are based on data where education is not differentiated by where it was obtained and age at migration is often imputed. The authors are then forced to make simplifying assumptions such as that immigrants arriving before age 14 receive their higher education in Canada and those arriving after age 23 receive it abroad. The variables in OILS allow more precision in this regard. The one other Canadian dataset that does not suffer from this problem is the precursor to the IALS/OILS, the LSUDA. Alboim, Finnie and Meng (2003) take advantage of these same sets of variables in a more complete investigation of education effects than we perform here. The differences between our approach and that in Alboim, Finnie and Meng (2003) were discussed above.

The adjusted basic specification in column 3 includes both the new immigrant experience variables described above and two dummy variables corresponding to immigrants whose source country was either: 1) the US or UK; or 2) any continental European country. We include these variables because previous studies have placed a great deal of emphasis on country of origin effects in explaining immigrant earnings patterns (e.g., Baker and Benjamin, 1994). In interpreting the estimates reported in column 3 note that the various experience coefficients are reported so that they can be read directly rather than as comparisons to, say, the Canadian experience variables.

The three sets of experience effects reported in the third column are all quite comparable in size, and tests of the hypothesis that they are equal to each other cannot be rejected at conventional significance levels. The estimated coefficients relating to the Canadian experience of immigrants who complete their education in Canada and the overall experience coefficient (which corresponds mainly to the experience effects for the native born) are extremely similar. The intercept coefficients for the two groups of immigrants are both negative but not precisely estimated. Nonetheless, the implication from the coefficients is that immigrants who complete their education abroad have earnings that are over 30% lower than comparable native born workers. This estimate applies to the base category, those with reasonable language skills in French or English and who are not from the US, the UK, or Europe. For those with poor

language skills, average annual earnings are another 45% lower. Finally, the country of origin effects suggest that immigrants from the US, UK or continental Europe have earnings that are over 20% higher than those of other immigrants, though these effects are not precisely estimated.

The adjusted basic specification is still, potentially, too restrictive. In particular, it restricts the returns to foreign experience (in terms of earnings in Canada) to be the same as returns to Canadian experience for the native born. In the fourth column of Table 4, we implement a specification in which we relax this restriction, allowing a separate return to foreign experience. This is important because Friedberg (2000) finds, using Israeli data, that negative immigrant entry earnings effects can be completely explained by a lower return to foreign experience than native experience. For immigrants from some countries, she found that foreign experience was worth zero in the Israeli labour market. These results are replicated for Canada by Alboim et al (2003). Similar to results in those papers, when we introduce foreign experience variables in column 4, the immigrant intercept for immigrants educated before arrival actually turns positive, though it is still not well defined. At the same time, the returns to Canadian experience for this group are now estimated to be 2% below those for the native born and Canadian educated immigrants in the period after entry into the Canadian labour market. Note that in this specification we have imposed the restriction that returns to Canadian experience for immigrants who complete their education in Canada are the same as those for the native born.¹² Finally, note that introducing the foreign experience effect does not change the returns to education, language impacts, and country of origin effects. The return to foreign experience itself is about one-third of the return to Canadian experience achieved by the native born and less than one-half of the return to Canadian experience obtained by immigrants who complete their education abroad. It is this low rate of return on foreign experience that is the source of the negative immigrant effects in the first three columns of the table. If we compare immigrant earnings to those of native born workers with the same total number of years of experience then

¹² Allowing the returns to differ for these two groups produces coefficients that are extremely similar, and the hypothesis that they are not statistically significantly different cannot be rejected at any conventional significance level.

we find that immigrant earnings are significantly lower. This occurs because the immigrants are obtaining quite low returns to some of those years of experience. Once we control for foreign experience, we are effectively comparing immigrants to native born workers with the same number of years of Canadian experience and it turns out that immigrant and native born workers have much more similar earnings when compared on that basis. This does not negate the fact that immigrants have lower earnings. However, it does help us understand that a main source of those lower earnings is an inability to transfer human capital acquired in a foreign labour market to Canada. It is worth noting, as well, that foreign experience does not suffer from the same difficulties as Canadian experience for immigrants. That is, there is no cohort dimension to the number of years an immigrant worked before arriving. Immigrants arriving in recent cohorts and cohorts from decades ago could all have the same distribution of foreign experience before arriving. The same is not true of Canadian experience: those arriving in earlier cohorts necessarily have more. This means that we can give the coefficient on foreign experience a standard human capital acquisition interpretation much as we have given to Canadian experience.¹³

The final column of Table 4 contains our preferred specification which we reach by first allowing a complete set of interactions among all immigrant, experience and education variables and then eliminating sets of interactions where testing indicates it is appropriate. Thus, for example, we allowed for different returns to education for immigrants who obtained their highest degree in Canada. We could not reject the restriction that the differences between these returns and those for the native born were zero at any conventional significance level. We also allowed for the possibility that each type of experience (whether foreign or Canadian acquired) might interact with each type of education. In each case, interaction coefficients involving immigrants who obtained their education after arrival in Canada were not statistically significantly different

¹³ However, Green and Worswick (2002) point out that native born earnings can also be organized in a cohort format and that doing so provides insights into the cross-cohort patterns in immigrant cohorts. In particular, they find that approximately 60% of the cross-cohort decline in immigrant earnings in the 1980s can be attributed to general declines across cohorts of new entrants of all kinds into the Canadian labour market.

nor economically substantially different from what was observed for the native born. Thus, in every dimension, immigrants educated after arrival appear to have equivalent returns to human capital when compared with the native born (after holding language ability constant). We do find evidence of significant interactions of Canadian experience with education for the native born (and immigrants educated after arrival) and of foreign experience with foreign education for immigrants educated before arrival. The coefficient that stands out most among these latter interactions is the interaction of foreign experience with a foreign university degree. This coefficient, when combined with the foreign experience coefficient for the base group (high school dropouts) implies that individuals with a foreign university degree obtain essentially zero returns to foreign experience. Individuals with lower levels of education appear to get positive, though still small, returns to foreign experience. This indicates that it may be harder to translate human capital to a new country the less manual are the skills involved.

The interactions among experience and other variables make interpretation of the coefficients in the last column of Table 4 difficult. We respond to this by presenting fitted average earnings for a set of specific cases characterized by differing levels of education and experience in the left panel of Table 6. To generate the entries in this table, we formed fitted average log earnings values for a base case person who is a native born worker who has not graduated from high school and has no Canadian experience. We also formed average log earnings for native born and immigrant workers with differing levels of Canadian and foreign experience and education. For the immigrants, we formed the fitted averages such that they are relevant for an individual who finished his education outside Canada, who is not from the US, the UK or Europe and who does not have poor language skills in English or French. The various fitted earnings are differenced relative to those of the base case native born individual. Since we are working with log earnings, differences in the numbers correspond approximately to percentage differences between workers with different characteristics. Thus, the entry in the first row and second column indicates that native born workers who have not graduated from high

school but have 10 years of experience earn approximately 90% more per year than similarly educated workers who have no experience (the base case).

An examination of the table entries corresponding to immigrants who have not graduated from high school with either 0 or 10 years of foreign experience (the 2nd and 3rd rows in the first column, respectively) indicates that low educated immigrants earn considerably more than similarly educated native born workers when they first enter the Canadian labour market. Moving from the foreign experience = 0 to the foreign experience = 10 entry in the first column shows the returns to foreign experience, which is substantial but much less than what the native born gain from their first 10 years of experience. Also, by moving along the second row, we can see the effects of increasing Canadian experience for a low educated worker who entered with no foreign experience. The larger increase as we move along this row rather than down the first column indicates that there is a much stronger return to Canadian experience than foreign experience for these immigrants. We can also compare the native born and immigrants at 20 years of experience. For the native born, the difference relative to the base case for someone with low education and 20 years of experience is given in the third column in the first row. Immigrants who arrived in Canada right out of school, and hence have no foreign experience, have an earnings differential at 20 years of experience relative to the base case given in the third column of the second row. Immigrants who have 10 years of foreign experience and then obtain 10 further years of experience have an average earnings differential given in the second column of the third row. All three numbers are similar in size, with the latter number being somewhat larger. Thus, the immigrant advantage right out of school is whittled away by the fact that the native born get a higher return to Canadian experience than do immigrants.

For high school graduates, the pattern is somewhat different. Immigrants with no foreign experience and no Canadian experience again earn more than do similar native born workers. However, a comparison of an immigrant with 10 years of foreign experience and no Canadian experience with a native born worker with 10 years of Canadian experience indicates that the immigrant earns about 16% less. This is an example of an immigrant earning less than a native

born worker with the same total experience because foreign experience is valued much less than Canadian experience. When the individuals we are comparing do not have any experience, the immigrants have higher average earnings. As before, at 20 years of experience, average earnings are about the same regardless of the combination of foreign and Canadian experience that underlies that 20 years.

For the university educated, foreign experience actually has a negative return, as witnessed by the fact that the average earnings differential is lower for a university educated immigrant with 10 years of foreign experience than one with 0 years. As with the high school educated, an immigrant with 10 years of foreign experience and no Canadian experience earns much less than a native born worker with 10 years of Canadian experience. Immigrants with 20 years of Canadian experience and no foreign experience and native born workers with 20 years of experience earn about the same amount but immigrants with 10 years of foreign experience and 10 years of Canadian experience earn about 40% less than the other two groups. Thus, the patterns are similar to those for the high school educated except that the returns to foreign experience are even worse for the university educated.

Males With Literacy Variables

In Table 5, we use the preferred specification from the runs without literacy variables but bring in the average literacy score – first not interacted with anything, including immigrant dummies. There are two sets of questions addressed in these regressions. First, are the returns to literacy lower for immigrants? In our framework, a difference in returns to a directly observed skill would imply a different price for the same skill which might mean there is discrimination. Of course, the skills might interact with others such as those associated with experience and then to the extent that those other skills are under-valued in Canada, literacy might also show up as under-valued just because the complementary skills are not there. However, there is very little evidence of interactions of literacy with other variables in these estimates – none for immigrants – so we can make statements straight from the literacy coefficients. The second issue is whether

differences in returns to education between immigrants and the native born are really literacy differences. We know from the earlier section that more educated immigrants are particularly disadvantaged relative to comparable native born in terms of literacy. The question is does that account for why we see lower returns to foreign education? Is there a problem in getting credentials for fully functional training recognized or is the problem that the foreign educational training does not generate as much cognitive skill?

The returns to literacy are relatively substantial, with a 100-point increase in literacy raising earnings by about the same amount as moving from being a drop out to a university grad. The immigrant effect for those educated before arriving becomes somewhat more positive, suggesting that differences between immigrants and the native born are partly just literacy difference. As in Green and Riddell (2003), none of the experience effects or experience interactions change. The main interesting difference is that the US/UK effect is cut by more than half and declines even more when we allow immigrants to have their own return to literacy. Returns to education are cut by a fair bit for the native born and returns to foreign education are cut even more. Thus, a lot of what foreign education seems to deliver is literacy.

In the second specification (column II in Table 5), we allow literacy to have a different effect for the two kinds of immigrants and for the native born. The result is that immigrants educated abroad get the same return as the native born while those educated here get a higher return. The latter could imply picking up some kind of language effect. Note the large positive coefficient on the dummy variable corresponding to immigrants who cannot answer the literacy question and are assigned the lowest score value. This suggests some kind of immigrant enclave effect allowing them to do better than one would predict given their literacy score and education. Once we introduce these complexities in returns to literacy, returns to university are about the same as for the native born. Returns to the other levels of education do not change much with the introduction of the literacy coefficients and remain much smaller than for the native born. Within the framework, the implication is that high school and post-secondary other than university education acquired abroad do not produce literacy (since their coefficients virtually do not change with the introduction of the literacy variable). However, foreign universities appear to produce literacy but at a lower rate than Canadian universities. Thus, the difference in returns to

foreign and Canadian university education actually turns out to be completely explainable by differences in universities in the two places generating literacy.

Next, (in column III) we split up literacy into document and quantitative effects. The patterns are intriguing. The native born get a big return to quantitative but none to document literacy. For immigrants it is the opposite. One way to interpret this would be that document scores for immigrants really pick up language ability in a more direct way than our self-reported variable. The fact that quantitative literacy gets no return for immigrants then would suggest that they are discriminated against since they get no return to a skill that is highly valued among the native born. However, this could be due to multi-collinearity. That is, it may just select this pattern but could easily select the opposite given the strong correlations among scores. We thus advise strong caution in pinning too much on that interpretation.

The last specification is the result of a specification search involving interactions of literacy scores of both types with education and experience. The result implies some interactions of literacy with experience and education for the native born but no such interactions for the foreign born. A key implication is that literacy does not change returns to experience in a substantial way for either the native born or immigrants. This fits with Green and Riddell(2003)'s conclusion that experience does not generate literacy. This suggests that experience is actually used to generate some other skill (i.e., one that is not measured in literacy scores). There is some evidence that this skill interacts with literacy skills for the native born (because literacy scores and experience variables have non-zero interaction effects) but these effects are not large. The interesting implication from the last column is that immigrants receive very similar returns to foreign and Canadian acquired experience but both are valued less than experience acquired by the Canadian born and immigrants educated in Canada. One might have expected literacy interactions to help explain this (i.e., that immigrants get less of a return to experience because they don't have the literacy skills to complement the experience generated skills) but the lack of significant interactions with skill implies that this is not the case. Whatever is behind the different returns to experience for Canadian and foreign educated workers it is not related to literacy. Thus, literacy does not help explain one of the key differences between immigrant and native born workers. It stands as a separate and interesting part of the immigrant assimilation process.

The right hand panel in Table 6 contains the fitted values holding literacy variables constant at their average value (292). Comparing this to the left panel, one sees similar patterns to those when literacy is not held constant. For example, university immigrants with no foreign experience and educated abroad earn much more than their native born counterparts. However, their lower return to experience implies that the two groups earn the same amount if they both have 20 years of Canadian experience. Foreign experience is actually a handicap for workers with this education level. The main difference between the two sets of numbers is that the immigrant earnings are higher at time of entry once we control for literacy. This is the opposite to what one would expect if discrimination were playing a large role.

Overall, examining literacy patterns is very helpful in understanding immigrant earnings. Both immigrants and the native born receive a considerable return to literacy skills. Once broken into types, immigrants appear to get particularly large returns from document literacy but none to quantitative literacy. The implication may be that immigrants can set themselves apart most effectively with language rather than quantitative skills. Conclusions in this vein should be taken with a grain of salt, though, since there is strong collinearity between the document and quantitative scores. Changes in education coefficients when we introduce literacy scores suggest that literacy does not provide an explanation for lower returns to foreign acquired high school and post-secondary (other than university) education. This may fit with our finding that literacy also does not explain differences in returns to experience between immigrants and the native born since both trade school type educations and experience may both serve to produce the same type of (non-cognitive) skills. However, differences in returns to foreign and Canadian acquired university education appear to be related to literacy differences. In particular, it appears that university education acquired abroad obtains lower returns because it does not generate as much in the way of literacy. Since the types of skills tested in literacy tests are likely the types of skills that university educated workers implement on the job, this makes sense.

Immigrants and the native born differ in their levels of literacy, with immigrants having lower levels. However, much of this difference is accounted for by a group of immigrants who appear to have essentially zero ability to answer the literacy tests. Interestingly, these individuals are not greatly punished in terms of earnings, suggesting the possibility of immigrant enclave effects.

Finally, as in other studies, we find that differences in returns to foreign (and Canadian experience) play a large role in understanding differences in immigrant and native born earnings. As in our earlier work, we find that literacy plays no role in helping to understand returns to experience: whatever skills are acquired through experience they appear not to be of the type measured in literacy tests. Thus, while literacy variables are helpful in furthering our understanding of immigrant earnings in various ways, they do not help in this dimension.

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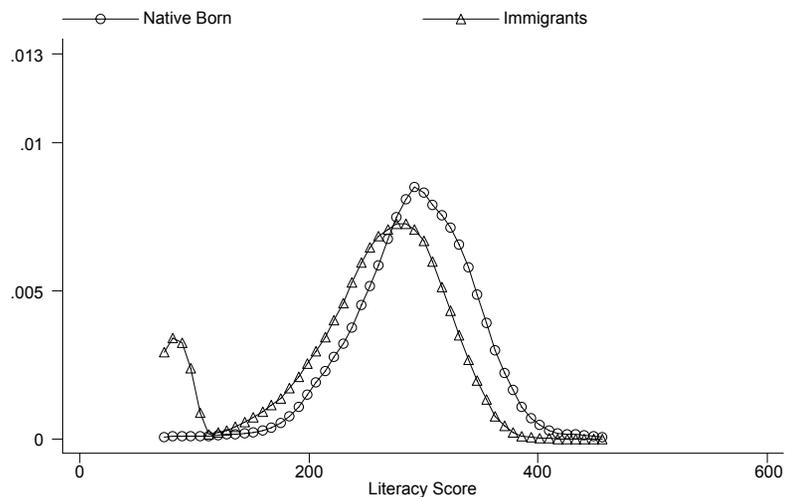


Fig.1(a) Distribution of Literacy

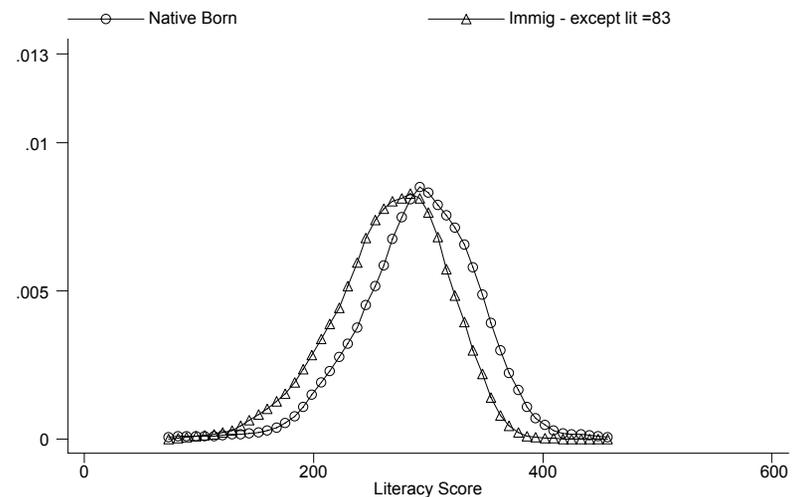


Fig.1(b) Distr. of Literacy (except lit = 83)

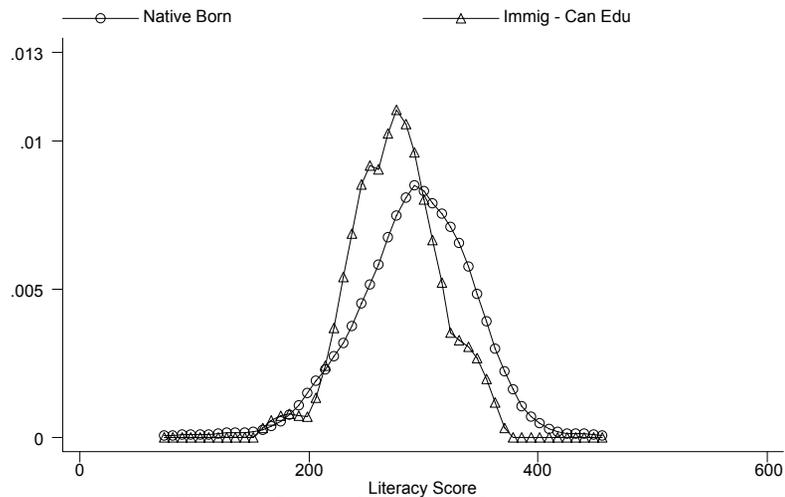


Fig.1(c) Distr. of Literacy (Can Edu)

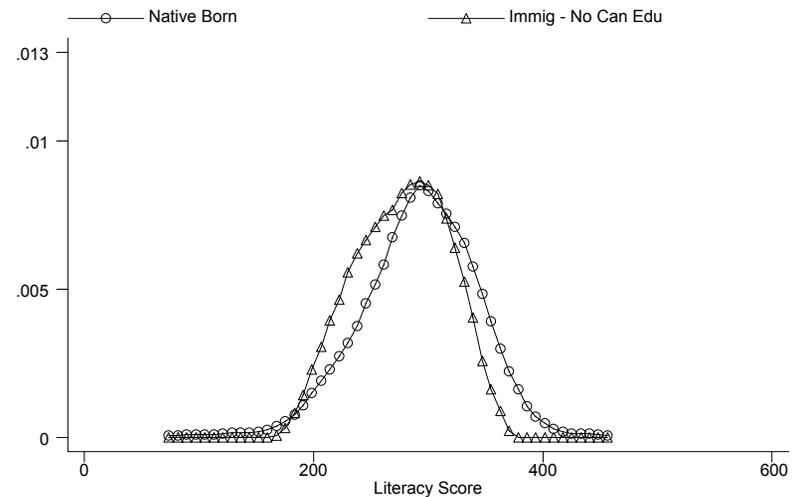


Fig.1(d) Distr. of Literacy (No Can Edu)

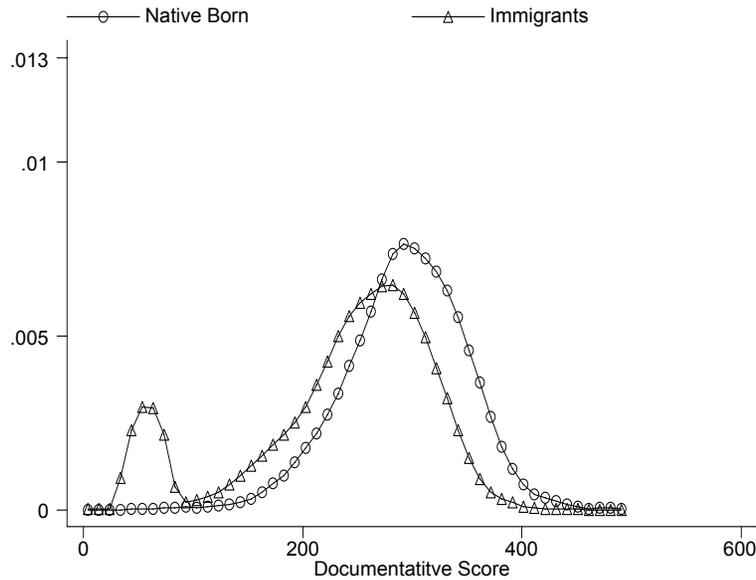


Fig.2(a) Distribution of Documentative Score

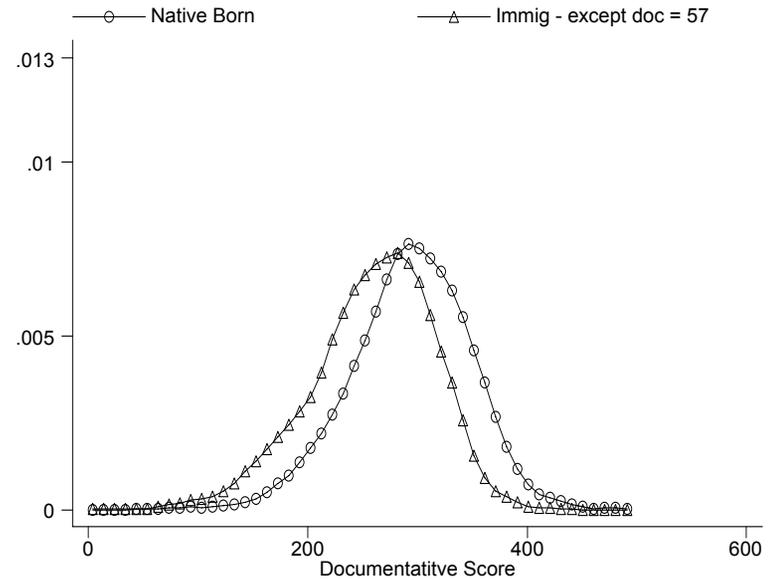


Fig.2(b) Distr. of Documentative (except doc=57)

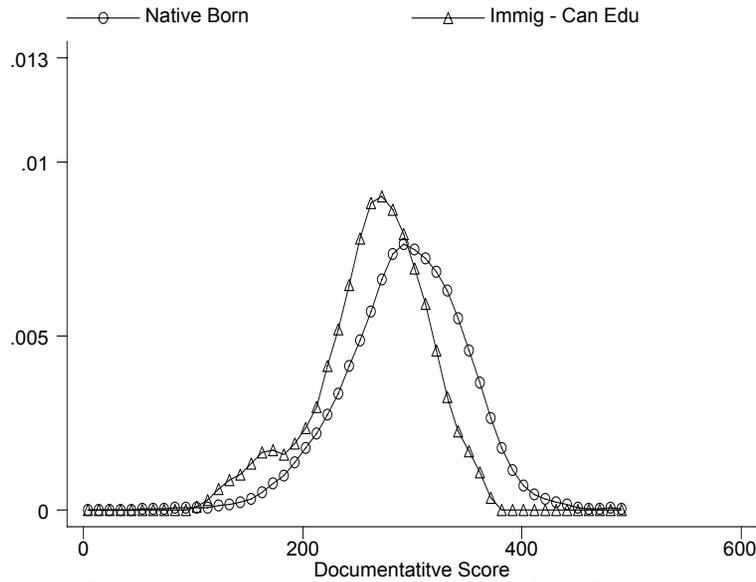


Fig.2(c) Distr. of Documentative (Can Edu)

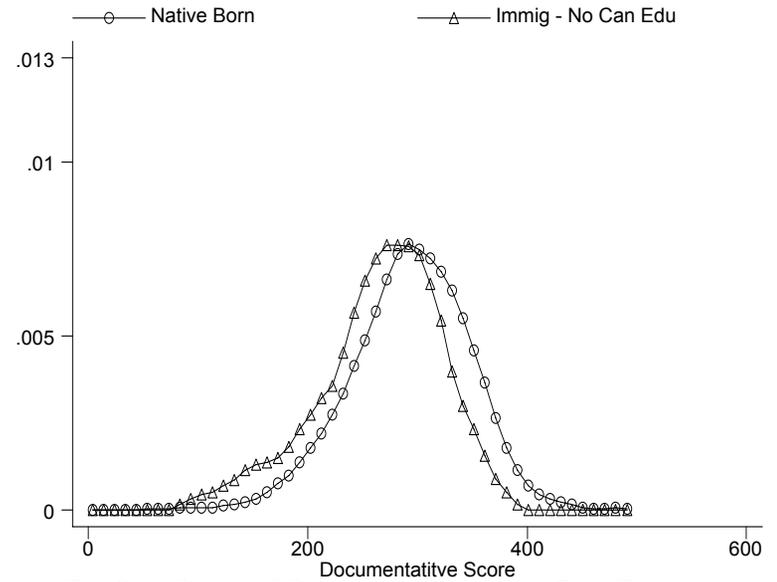


Fig.2(d) Distr. of Documentative (No Can Edu)

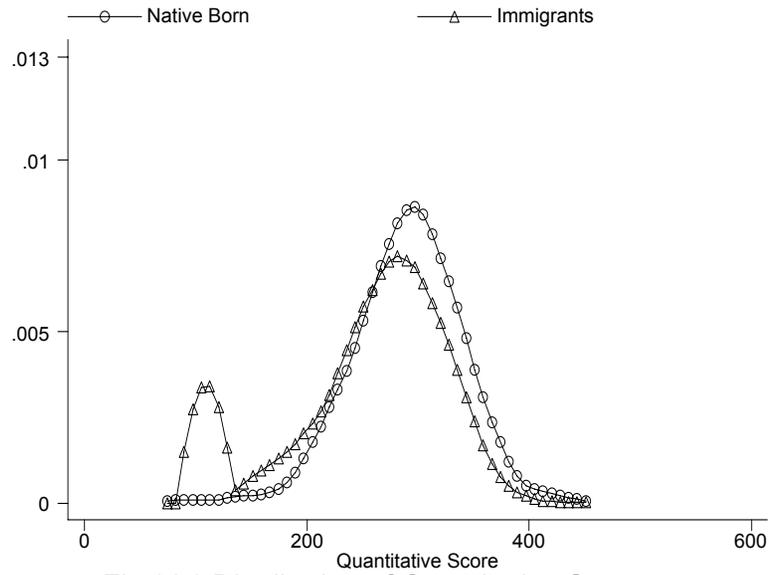


Fig.3(a) Distribution of Quantitative Score

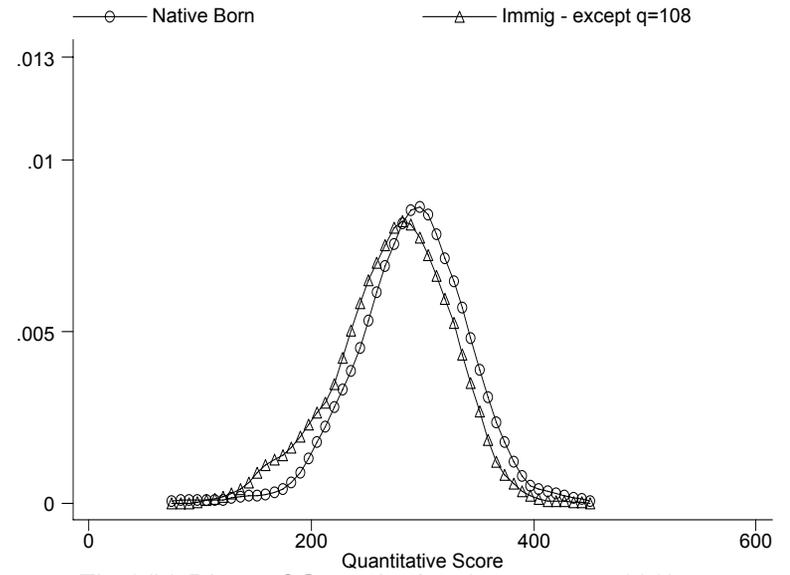


Fig.3(b) Distr. of Quantitative (except q = 108)

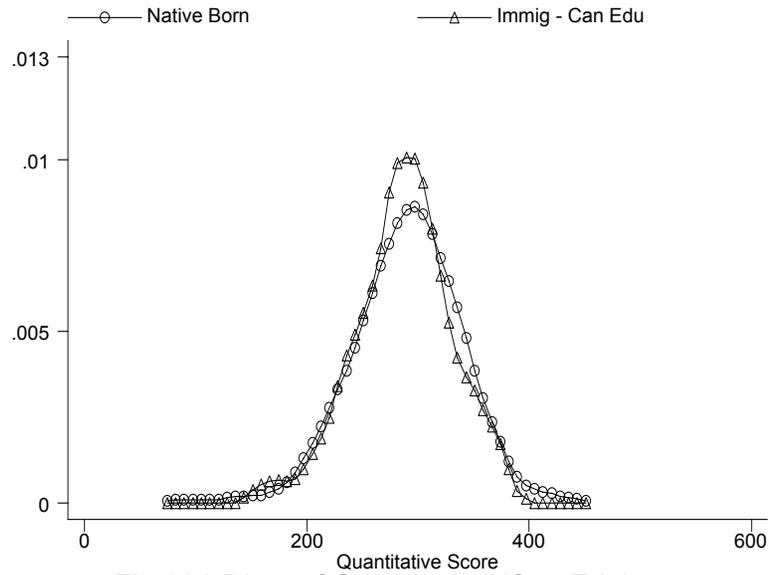


Fig.3(c) Distr. of Quantitative (Can Edu)

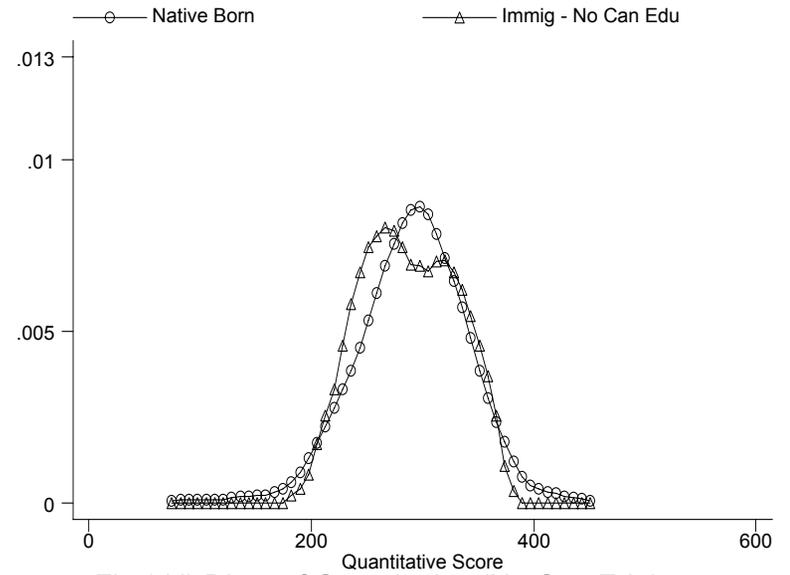


Fig.3(d) Distr. of Quantitative (No Can Edu)

Table 1. Summary Statistics for Immigrant and Native Born Workers

	OILS 1997 and IALS 1994				Urban Ontario (Census 1996)			
	IMMIGRANTS		NATIVE BORN (Ontario)		IMMIGRANTS		NATIVE BORN	
	Male	Female	Male	Female	Male	Female	Male	Female
Annual wage	40,149	25,790	39,882	29,512	38,512	26,904	40,865	29,348
Hours worked	44	36	43	35	38	31	38	31
Weeks worked	49	48	48	48	46	44	46	45
Age	43	42	38	37	42	41	37	37
Experience	23	23	19	17	22	22	17	17
Canadian	16	7	-	-	-	-	-	-
Foreign	7	13	-	-	-	-	-	-
Years of education	13	13	13	14	14	15	14	14
% less than HS	23	22	27	14	25	23	21	15
% HS	26	31	39	36	19	24	27	29
Foreign	18	19	-	-	-	-	-	-
Canadian	8	12	-	-	-	-	-	-
% College	22	26	20	28	32	32	30	31
Foreign	10	10	-	-	-	-	-	-
Canadian	12	16	-	-	-	-	-	-
% University	29	21	14	22	24	21	22	25
Foreign	14	11	-	-	-	-	-	-
Canadian	15	10	-	-	-	-	-	-
Years since migration	20	20	-	-	19	19	-	-
Age at immigration	23	22	-	-	25	25	-	-
% less than 8 YSM	19	21	-	-	16	16	-	-
Literacy Score	238	235	288	296	-	-	-	-
Numeracy Score	262	249	285	292	-	-	-	-
Observations	1,350	1,283	275	260	16,125	14,078	7,437	6,721

Table 2. Summary Statistics by Origin of Education

	MALES				FEMALES			
	Immigrants			Native born	Immigrants			Native born
	All	Can. Edu	No Can. Edu		All	Can. Edu	No Can. Edu	
Annual wage	40,149	47,077	35,712	39,882	25,790	30,113	22,824	29,512
Hours worked	44	44	44	43	36	36	36	35
Weeks worked	49	49	49	48	48	49	47	48
Age	43	40	45	38	42	39	44	37
Experience	23	18	26	19	23	18	27	17
Canadian	16	17	16	-	7	17	16	-
Foreign	7	1	10	-	13	1	11	-
Years of Education	13	15	12	13	13	14	12	14
% less than HS	23	10	31	27	22	8	32	14
% HS	26	21	29	39	31	28	33	36
Foreign	18	-	29	-	19	-	33	-
Canadian	8	21	-	-	12	28	-	-
% College	22	31	16	20	26	40	16	28
Foreign	10	-	16	-	10	-	16	-
Canadian	12	31	-	-	16	40	-	-
% University	29	38	24	14	21	24	19	22
Foreign	14	-	24	-	11	-	19	-
Canadian	15	38	-	-	10	24	-	-
Years s. migration	20	26	16	-	20	25	16	-
Age at immigration	23	14	28	-	22	14	29	-
% less than 8 YSM	19	8	25	-	21	8	30	-
Literacy Score	238	272	216	288	235	270	211	296
Numeracy Score	262	289	244	285	249	277	229	292
Observations	1,350	527	823	275	1,283	522	761	260

**Table 3. Regressions with Literacy Score
as the Dependent Variable**

	Males	Females
Can Exp (NB)	0.48 (.31)	1.00 (.30)***
Can Exp2 (NB)	-0.027 (.0069)***	-0.037 (.0072)***
Immigrants with Can Ed	-56.89 (25.04)**	-19.21 (18.98)
Can Exp (Imm - Can Ed)	3.08 (1.36)**	-0.08 (1.33)
Can Exp2 (Imm - Can Ed)	-0.070 (.042)	0.0008 (.033)
Immigrants w/o Can Ed	-52.43 (16.11)***	1.73 (13.74)
Can Exp (Imm - No Can Ed)	1.72 (1.24)	-1.84 (1.05)**
Can Exp2 (Imm - No Can Ed)	-0.057 (.032)*	0.043 (.028)
Foreign Experience	-0.47 (1.07)	-1.69 (0.874)*
Foreign Experience2	0.0047 (.036)	0.036 (.028)
High School (Can)	27.81 (2.79)***	33.64 (2.88)***
Post Secondary (Can)	34.73 (3.53)***	58.31 (3.08)***
University (Can)	75.42 (3.18)**	72.97 (3.75)***
Foreign High School (Imm)	-0.97 (10.57)	14.33 (9.34)**
Foreign Post Sec. (Imm)	26.32 (12.68)**	34.407 (11.22)***
Foreign University (Imm)	67.67 (10.76)***	38.60 (10.54)***
Can High School (Imm)	23.82 (25.97)	44.02 (14.89)***
Can Post Sec. (Imm)	7.04 (25.20)	37.37 (14.39) ***
Can University (Imm)	40.59 (24.42)	67.30 (15.41)***
Language Other	-14.95 (6.44)**	4.10 (5.88)
US or UK Origin	36.49 (9.07)***	28.04 (7.91)***
European Origin	15.88 (8.23)*	-1.52 (6.50)
Unable to answer Literacy	-149 (12.28) ***	-162 (8.53)***
Observations	2015	1946
R2	0.47	0.52

(***) Coefficient is significant at 1% significance level
(**) Coefficient is significant at 5% significance level
(*) Coefficient is significant at the 10% significance level

Table 4. Annual Earnings Regressions without Literacy Effects (MALES)

	Census	Basic 1	Basic 2	Expanded	Preferred
Immigrant	-0.55 (0.017)	-0.52*** (0.18)	--	--	--
Immigrant (Education After Arrival)	--	--	-0.17 (0.19)	-0.082 (0.11)	0.35*** (0.12)
Immigrant (Education Before Arrival)	--	--	-0.33 (0.21)	0.34 (0.24)	0.73** (0.35)
Language Expression	Yes	-0.33*** (0.12)	-0.45*** (0.12)	-0.44*** (0.12)	-0.42*** (0.12)
Years since Migration	0.030 (0.0016)	.034** (0.015)	--	--	--
Years since Migration2	-0.037 (0.0038)	-0.042 (0.032)	--	--	--
Experience	0.089 (0.0013)	0.088*** (0.0056)	0.087*** (0.0059)	--	--
Experience2 (/100)	-0.15 (0.0027)	-0.15*** (0.013)	-0.15*** (0.013)	--	--
Cdn Exp - Immig. (Education After Arrival)	--	--	0.092*** (0.025)	--	--
Cdn Exp2 - Immig (Education After Arrival)	--	--	-0.15* (0.079)	--	--
Cdn Exp - Immig (Education Before Arrival)	--	--	0.11*** (0.024)	0.071*** (0.024)	0.062*** (0.025)
Cdn Exp2 - Immig (Education Before Arrival)	--	--	-0.18*** (0.063)	-0.15** (0.063)	-0.14** (0.063)
Canadian Experience^a	--	--	--	0.091*** (0.0058)	0.11*** (.0072)
Canadian Experience2	--	--	--	-0.16*** (0.013)	-0.17*** (0.014)
Foreign Experience	--	--	--	0.031 (0.021)	0.051** (0.024)
Foreign Experience2	--	--	--	-0.14** (0.069)	-0.16** (0.073)
High School	0.05*** (0.014)	0.006 (0.53)	0.0089 (0.053)	0.0059 (0.053)	--
Post Secondary	0.26*** (0.013)	0.16** (0.066)	0.17*** (0.066)	0.17** (0.066)	--
University	0.53*** (0.014)	0.49*** (0.059)	0.49*** (0.059)	0.49*** (0.059)	--
High School (Native Born)	--	--	--	--	0.37*** (0.11)
Post Secondary (Native Born)	--	--	--	--	0.67*** (0.13)
University (Native Born)	--	--	--	--	0.70*** (0.12)
Foreign High School	--	--	--	--	-0.00086 (0.32)
Foreign Post Secondary	--	--	--	--	0.38 (0.34)

Foreign University	--	--	--	--	0.56* (0.29)
HS * Canadian Exp (Native Born)	--	--	--	--	-0.016*** (0.0045)
Post Sec * Cdn Exp (Native Born)	--	--	--	--	-0.028*** (0.0066)
Univ. * Cdn Exp (Native Born)	--	--	--	--	-0.0047 (0.0053)
Frg. HS*Foreign Exp (Immigrants)	--	--	--	--	-0.013 (0.024)
Frg. Post Sec*For. Exp (Immigrants)	--	--	--	--	-0.023 (0.033)
Frg. Univ.*For. Exp (Immigrants)	--	--	--	--	-0.053*** (0.019)
Country of Origin US - UK	--	--	0.21 (0.17)	0.21 (0.17)	0.28* (0.17)
Country of Origin Europe	--	--	0.26 (0.16)	0.22 (0.15)	0.12 (0.16)
Observations		2,015	2,015	2,015	2,015
Adjusted R2		0.197	0.195	0.194	0.204
<p>(***) Indicates the coefficient is significant at 1% a. This includes Canadians and Immigrants educated in Canada</p>					

Table 5. Annual Earnings Regressions with Literacy Effects (MALES)

	(I)	(II)	(III)	(IV) Preferred
Literacy Score	0.0036*** (0.00042)	--	--	--
Literacy Score (Native Born)	--	0.0036*** (0.00046)	--	--
Literacy - Immigrants (Education After Arrival)	--	0.0071*** (0.0017)	--	
Literacy - Immigrants (Education Before Arrival)	--	0.0033** (0.0015)	--	
Unable to Answer Literacy Questions	--	0.37 (0.32)	0.36 (0.32)	0.36 (0.32)
Quant. Lit. (Native Born)	--	--	0.0032*** (0.0022)	-0.0073** (0.0030)
Quant. Lit. - Immigrants (Education After Arrival)	--	--	0.0011 (0.0016)	0.0019 (0.0016)
Quant Lit - Immigrants (Education Before Arrival)	--	--	-0.0011 (0.0021)	-0.0011 (0.0020)
Doc. Lit. (Native Born)	--	--	0.00061 (0.00062)	0.0085*** (0.0030)
Doc. Lit. - Immigrants (Education After Arrival)	--	--	0.0058*** (0.0015)	0.0054*** (0.0015)
Doc. Lit. - Immigrants (Education Before Arrival)	--	--	0.0039** (0.0018)	0.0039** (0.0017)
Immigrant (Education After Arrival)	0.36*** (0.12)	-0.57 (0.50)	-0.51 (0.50)	-0.92 (0.54)
Immigrant (Education Before Arrival)	0.97*** (0.34)	0.93* (0.51)	1.12** (0.53)	0.66 (0.57)
Language Expression	-0.33*** (0.13)	-0.33*** (0.13)	-0.31** (0.12)	-0.33** (0.12)
Cdn Experience - Immig (Education Before Arrival)	0.062*** (0.024)	0.060*** (0.024)	0.057*** (0.024)	0.057** (0.024)
Cdn Experience Sq - Immig (Education Before Arrival)	-0.13** (0.062)	-0.13** (0.063)	-0.12** (0.063)	-0.12* (0.070)
Cdn Experience (Native Born)	0.10*** (0.0072)	0.10*** (0.0072)	0.10*** (0.0072)	0.094*** (0.0091)
Canadian Experience2 (Native Born)	-0.16*** (0.013)	-0.16*** (0.014)	-0.16*** (0.013)	-0.18*** (0.014)
Foreign Experience	0.049** (0.024)	0.055** (0.024)	0.058*** (0.024)	0.059** (0.023)
Foreign Experience2	-0.15** (0.072)	-0.17** (0.072)	-0.17** (0.073)	-0.18** (0.070)
Country of Origin US - UK	0.12 (0.17)	-0.022 (0.18)	0.0061 (0.18)	0.0030 (0.18)

Country of Origin	0.13	0.059	0.078	0.11
Europe	(0.15)	(0.16)	(0.16)	(0.15)
High School	0.24**	0.23**	0.25**	0.044
(Native Born)	(0.11)	(0.11)	(0.11)	(0.35)
Post Secondary	0.53***	0.52***	0.54***	-2.04**
(Native Born)	(0.13)	(0.13)	(0.13)	(0.48)
University	0.41***	0.40***	0.38***	0.40
(Native Born)	(0.12)	(0.12)	(0.12)	(0.44)
Foreign High School	-0.15	-0.040	-0.043	-0.033
	(0.32)	(0.32)	(0.32)	(0.32)
Foreign Post Secondary	0.18	0.30	0.34	0.36
	(0.35)	(0.35)	(0.35)	(0.34)
Foreign University	0.24	0.39	0.39	0.41
	(0.29)	(0.31)	(0.31)	(0.30)
HS * Canadian Exp	-0.015***	-0.014***	-0.015***	-0.025***
(Native Born)	(0.0044)	(0.0043)	(0.0044)	(0.0050)
Post Sec * Cdn Exp	-0.028***	-0.027***	-0.028***	-0.029***
(Native Born)	(0.0065)	(0.0065)	(0.0065)	(0.0072)
Univ. * Cdn Exp	-0.0041	-0.0037	-0.0037	-0.014**
(Native Born)	(0.0052)	(0.0052)	(0.0052)	(0.0062)
For. HS*Foreign Exp	-0.0062	-0.010	-0.0091	-0.0097
(Immigrants)	(0.024)	(0.024)	(0.024)	(0.024)
For. Post Sec*For. Exp	-0.024	-0.027	-0.030	-0.031
(Immigrants)	(0.033)	(0.033)	(0.033)	(0.033)
For. Univ.*For. Exp	-0.057***	-0.059***	-0.060***	-0.059***
(Immigrants)	(0.019)	(0.019)	(0.019)	(0.018)
Quant. Lit. * Exp	--	--	--	0.00041***
(Native Born)				(0.000086)
Doc. Lit. * Exp	--	--	--	-0.00033***
(Native Born)				(0.000082)
Quant. Lit.*High School	--	--	--	0.011
(Native Born)				(0.0026)
Quant. Lit.*Post. Sec.	--	--	--	0.001
(Native Born)				(0.0027)
Quant. Lit. * Univ.	--	--	--	0.003
(Native Born)				(0.0024)
Doc. Lit.*High School	--	--	--	-0.010
(Native Born)				(0.0025)
Doc Lit.*Post. Sec.	--	--	--	0.008
(Native Born)				(0.0028)
Doc. Lit. * Univ.	--	--	--	-0.002
(Native Born)				(0.0023)
Observations	2,015	2,015	2,015	2,015
Adjusted R2	0.233	0.234	0.237	0.271

Table 6. Fitted Returns to Immigrants and Canadians by Experience and Education (Males)

	Interaction Education-Experience			Interaction Literacy-Human Capital		
	Canadian Exp = 0	Canadian Exp = 10	Canadian Exp = 20	Canadian Exp = 0	Canadian Exp = 10	Canadian Exp = 20
Canadian (No Education)	0.000	0.891	1.437	0.000	0.993	1.631
		(0.0605)	(0.0982)		(0.308)	(0.309)
Immigrant (No Education)						
Foreign Exp = 0	0.731	1.215	1.426	1.115	1.562	1.771
	(0.3488)	(0.2916)	(0.2817)	(0.448)	(0.406)	(0.399)
Foreign Exp = 10	1.078	1.562	1.773	1.527	1.974	2.184
	(0.3035)	(0.2345)	(0.2288)	(0.415)	(0.367)	(0.363)
Canadian (High School)	0.372	1.103	1.488	0.497	1.242	1.634
	(0.1121)	(0.1167)	(0.1216)	(0.297)	(0.294)	(0.294)
Immigrant (Foreign HS)						
Foreign Exp = 0	0.730	1.214	1.425	1.082	1.528	1.738
	(0.3548)	(0.2880)	(0.2836)	(0.445)	(0.393)	(0.391)
Foreign Exp = 10	0.944	1.428	1.639	1.397	1.843	2.053
	(0.2661)	(0.3234)	(0.3126)	(0.390)	(0.457)	(0.449)
Canadian (University)	0.700	1.544	2.044	0.686	1.533	2.027
	(0.1220)	(0.1208)	(0.1274)	(0.305)	(0.300)	(0.304)
Immigrant (University)						
Foreign Exp = 0, Foreign Uni.	1.296	1.779	1.989	1.522	1.969	2.178
	(0.2874)	(0.2345)	(0.2486)	(.387)	(0.352)	(0.362)
Foreign Exp = 10, Foreign Uni.	1.114	1.598	1.809	1.336	1.779	1.991
	(0.2530)	(0.1966)	(0.2187)	(0.365)	(0.331)	(0.344)

English Speaking Canadian Male Workers with average literacy score (when required), no education or experience normalized to zero

Table 7. Annual Earnings Regressions without Literacy Effects (FEMALES)

	Census	Basic 1	Basic 2	Expanded	Preferred
Immigrant	-0.61*** (0.020)	-0.49*** (0.18)	--	--	--
Immigrant (Education After Arrival)	--	--	-0.28 (0.28)	-0.18 (0.28)	-0.59 (0.90)
Immigrant (Education Before Arrival)	--	--	-0.32 (0.21)	-0.01 (0.24)	0.57* (0.33)
Language Expression	Yes	-0.26** (0.12)	-0.44*** (0.13)	-0.46** (0.13)	-0.45*** (0.13)
Years since Migration	0.043*** (0.0019)	0.046*** (0.016)	--	--	--
Years since Migration2	-0.068*** (0.0046)	-0.063* (0.033)	--	--	--
Experience	0.071*** (0.0015)	0.075*** (0.0064)	0.076*** (0.0066)	--	--
Experience2 (/100)	-0.129*** (0.0032)	-0.18*** (0.015)	-0.18*** (0.016)	--	--
Cdn Exp - Immig. (Education After Arrival)	--	--	0.058* (0.031)	0.130*** (0.0203)	0.182*** (0.047)
Cdn Exp2 - Immig (Education After Arrival)	--	--	-0.17** (0.077)	-0.35*** (0.745)	-0.38*** (0.076)
Cdn Exp - Immig (Education Before Arrival)	--	--	0.02 (0.024)	0.070*** (0.024)	0.082*** (0.024)
Cdn Exp2 - Immig (Education Before Arrival)	--	--	-0.02 (0.065)	-0.13** (0.064)	-0.178** (0.065)
Canadian Experience^a	--	--	--	0.085*** (0.0069)	0.09*** (.0010)
Canadian Experience2	--	--	--	-0.21*** (0.017)	-0.22*** (0.018)
Foreign Experience	--	--	--	0.020 (0.020)	0.01 (0.020)
Foreign Experience2	--	--	--	-0.031 (0.064)	-0.03 (0.064)
High School	0.10*** (0.016)	0.36*** (0.064)	0.40*** (0.064)	0.40*** (0.063)	--
Post Secondary	0.27*** (0.016)	0.72*** (0.068)	0.76*** (0.068)	0.76*** (0.078)	--
University	0.61*** (0.018)	1.06*** (0.080)	1.10*** (0.080)	1.11*** (0.080)	--
High School (Native Born)	--	--	--	--	0.32** (0.14)
Post Secondary (Native Born)	--	--	--	--	1.05*** (0.14)
University (Native Born)	--	--	--	--	1.33*** (0.17)
Foreign High School	--	--	--	--	0.15 (0.21)
Foreign Post Secondary	--	--	--	--	0.49** (0.25)
Foreign University	--	--	--	--	0.29

					(0.23)
Can HS (immigrants)	--	--	--	--	0.84 (0.922)
Can PS (immigrants)	--	--	--	--	1.120 (0.930)
Can University (immigrants)	--	--	--	--	1.966** (0.921)
HS * Canadian Exp (Native Born)	--	--	--	--	0.005 (0.006)
Post Sec * Cdn Exp (Native Born)	--	--	--	--	-0.014** (0.0066)
Univ. * Cdn Exp (Native Born)	--	--	--	--	-0.006 (0.0083)
Can. HS*Can Exp (Immigrants)	--	--	--	--	-0.022 (0.041)
Can. Post Sec* Can. Exp (Immigrants)	--	--	--	--	-0.057 (0.415)
Can. Univ.* Can. Exp (Immigrants)	--	--	--	--	-0.057 (0.423)
Country of Origin US - UK	--	--	0.20 (0.18)	0.28 (0.18)	0.35* (0.18)
Country of Origin Europe	--	--	0.41*** (0.15)	0.36** (0.15)	0.17 (0.15)
Observations	20,799	1,946	1,946	1,946	1,946
Adjusted R2	0.220	0.210	0.214	0.221	0.237
(***) Indicates the coefficient is significant at 1%					
a. Native Born only					

Table 9. Returns to Education and Experience and Literacy (Females)

	Interaction Education-Experience			Interaction Literacy-Human Capital		
	Canadian Exp = 0	Canadian Exp = 10	Canadian Exp = 20	Canadian Exp = 0	Canadian Exp = 10	Canadian Exp = 20
Canadian (No Education)	0.000	0.657	0.904	0.000	0.774	1.096
		(0.0532)	(0.0768)		(0.4991)	(0.5544)
Immigrant (No Education)						
Foreign Exp = 0	0.085	1.219	1.775	0.155	1.290	2.254
	(0.1938)	(0.1535)	(0.1886)	(7.6155)	(0.8539)	(0.7902)
Foreign Exp = 10	0.112	1.246	1.801	-0.586	0.667	1.344
	(0.2091)	(0.1669)	(0.1929)	(2.0677)	(1.8141)	(1.1074)
Canadian (High School)	0.433	1.090	1.337	0.572	1.276	1.527
	(0.0658)	(0.0786)	(0.0955)	(0.7461)	(0.4996)	(0.5067)
Immigrant (Foreign HS)						
Foreign Exp = 0	0.479	1.441	1.829	0.601	1.574	1.971
	(0.2490)	(0.1910)	(0.1917)	(2.7253)	(0.9170)	(0.7711)
Foreign Exp = 10	0.502	1.468	1.856	0.409	1.454	1.626
	(0.2243)	(0.1749)	(0.1894)	(3.4608)	(0.8901)	(1.1732)
Canadian (University)	1.260	1.916	2.163	1.435	2.073	2.259
	(0.0849)	(0.0999)	(0.1163)	(0.5122)	(0.4194)	(0.4300)
Immigrant (University)						
Foreign Exp = 0, Local Uni.	1.345	2.105	2.287	1.517	2.268	2.442
	(0.2096)	(0.1623)	(0.1937)	(1.1084)	(0.6291)	(0.6773)
Foreign Exp = 0, Foreign	0.896	1.657	1.839	0.946	1.731	1.939
	(0.2516)	(0.1863)	(0.1863)	(1.8449)	(0.8426)	(0.7722)
Foreign Exp = 10, Foreign	0.923	1.683	1.865	1.414	2.148	2.305
	(0.2447)	(0.1946)	(0.2089)	(1.3343)	(0.7827)	(0.7855)

English Speaking Canadian Female Workers with average literacy score (when required), no education or experience normalized to zero

APPENDIX

Table 1A. Summary Statistics by Literacy Score (Immigrants)

	Male		Female	
	Not assigned minimum score	Assigned minimum score	Not assigned minimum score	Assigned minimum score
Annual earnings	41,483	26,061	26,920	17,501
Age	42	46	42	45
Experience	22	32	22	31
Canadian	16	17	16	17
Foreign	6	15	6	14
Years of Education	14	8	14	8
% High school	27	19	32	23
Foreign	18	19	13	22
Canadian	9	-	19	1
% College	24	5	29	8
Foreign	11	3	10	6
Canadian	13	2	18	2
% University	32	4	24	1
Foreign	16	4	13	1
Canadian	17	-	11	-
Age at immigration	22	29	22	28
Years since migration	20	18	20	17
Understand English	Well/Very Well (67%)	Well/Very Well (17%)	Well/Very Well (63%)	Well/Very Well (15%)
First Language	English (20%) Spanish (17%)	Italy/Port (54%) Cant/Mand (17%)	English (23%) Spanish (15%)	Italy/Port (47%) Cant/Mand (19%)
Lang used at work	English (91%)	English (31%)	English (85%)	English (33%)
Use Lit skills at work	Never (16%)	Never (60%)	Never (15%)	Never (42%)
Conversation in English	99%	53%	99%	55%
Observations	1,205	145	1,129	154

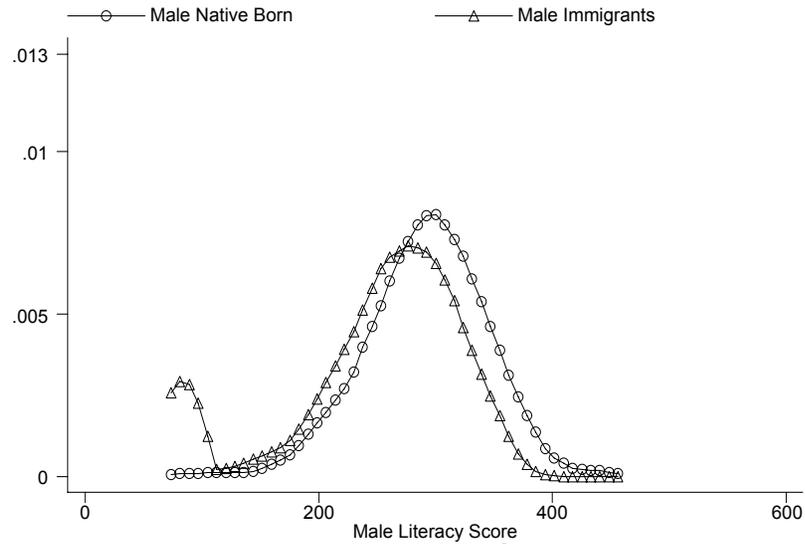


Fig.1(a) Male Distribution of Literacy

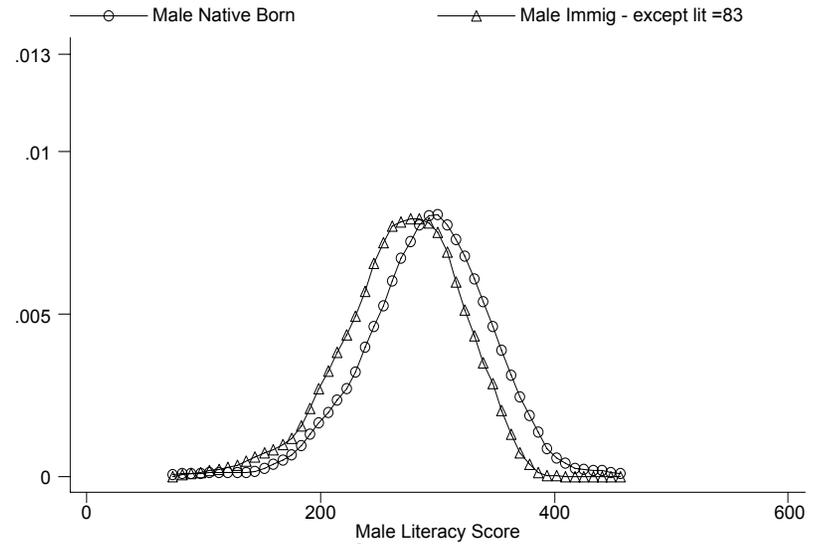


Fig.1(b) Male Distr. of Literacy (except q = 108)

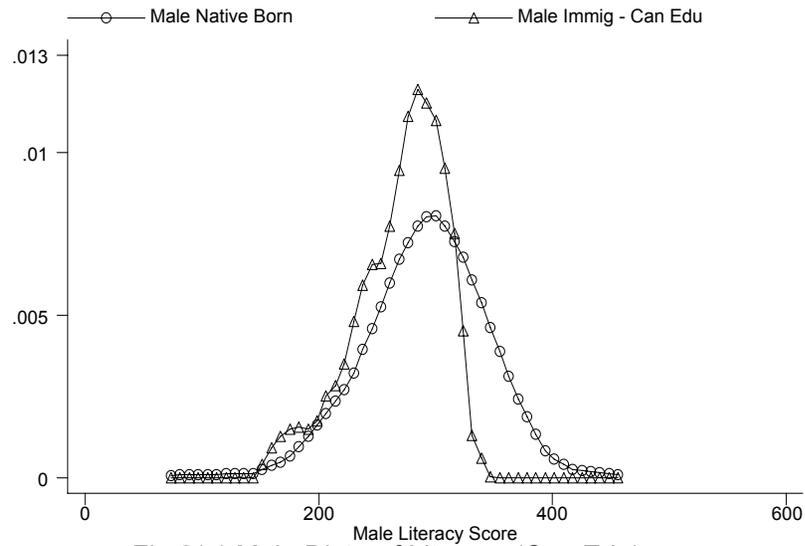


Fig.2(a) Male Distr. of Literacy (Can Edu)

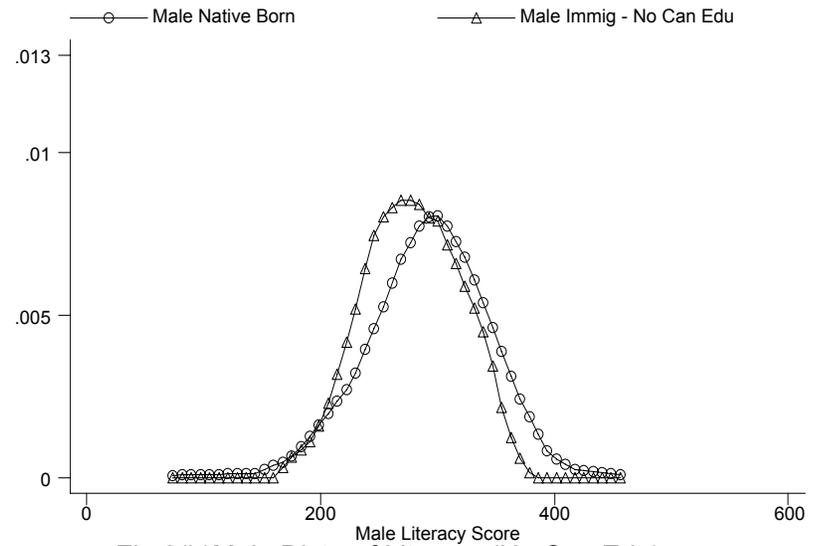


Fig.2(b) Male Distr. of Literacy (No Can Edu)

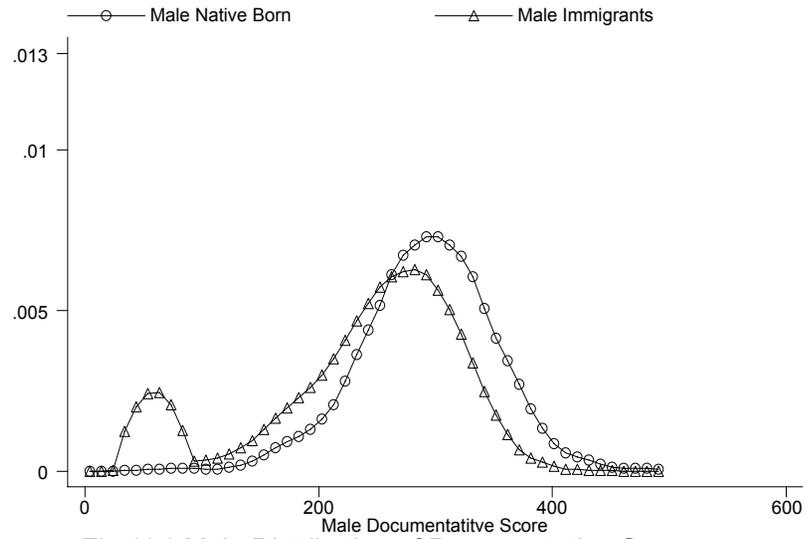


Fig.1(a) Male Distribution of Documentative Score

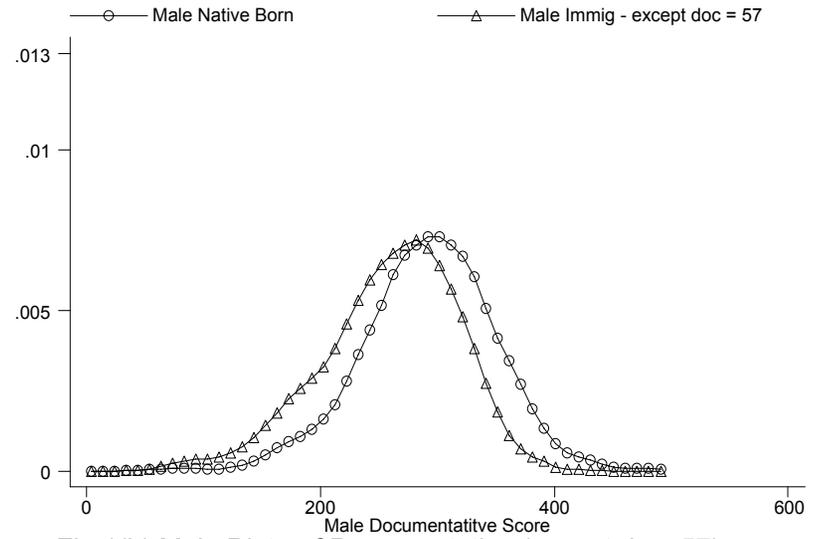


Fig.1(b) Male Distr. of Documentative (except doc=57)

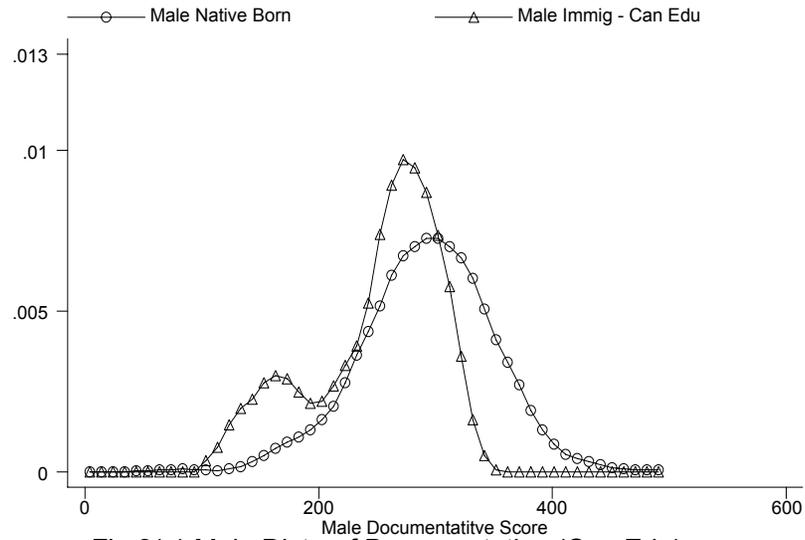


Fig.2(a) Male Distr. of Documentative (Can Edu)

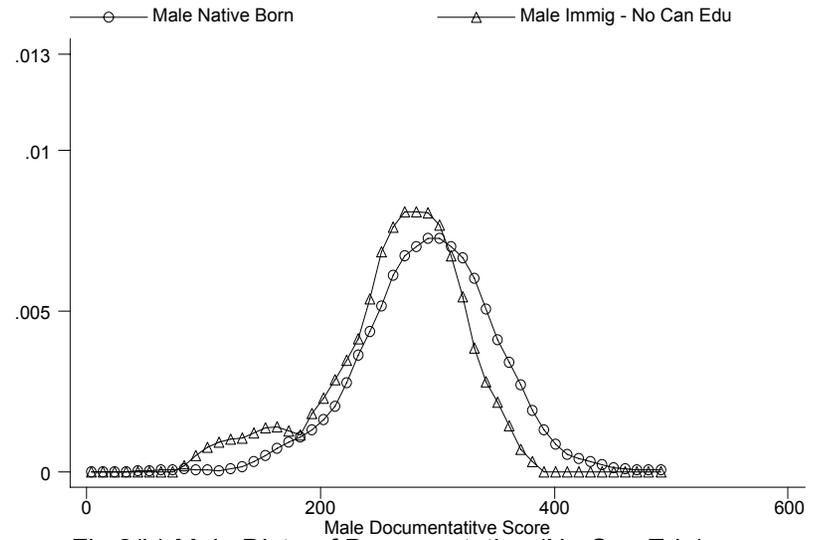


Fig.2(b) Male Distr. of Documentative (No Can Edu)

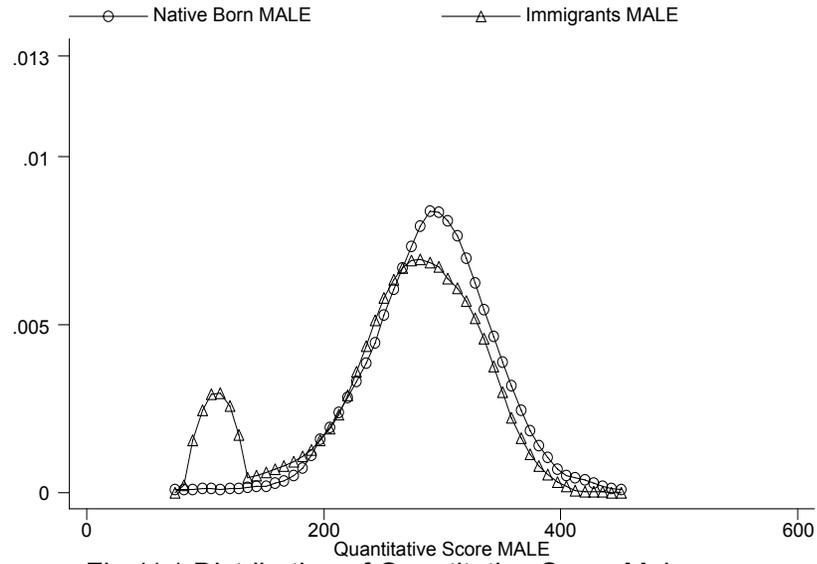


Fig.1(a) Distribution of Quantitative Score Males

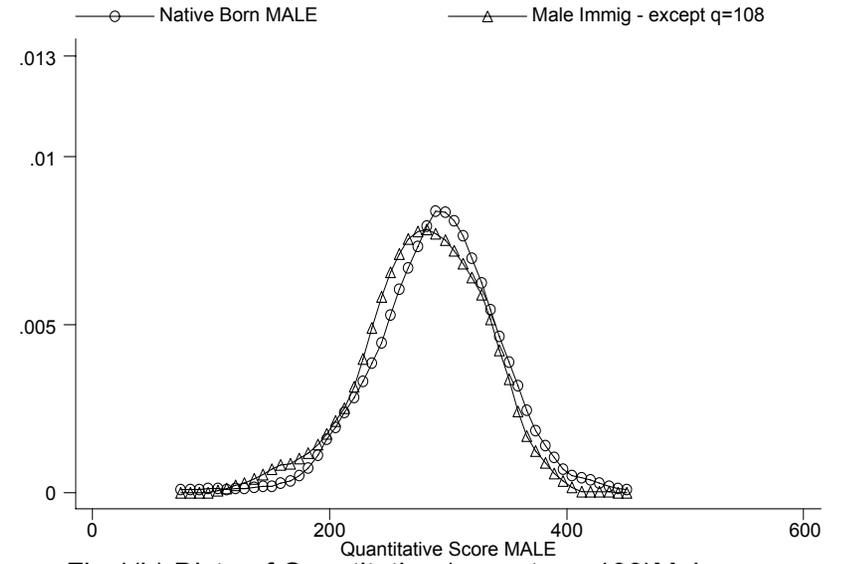


Fig.1(b) Distr. of Quantitative (except q = 108)Males

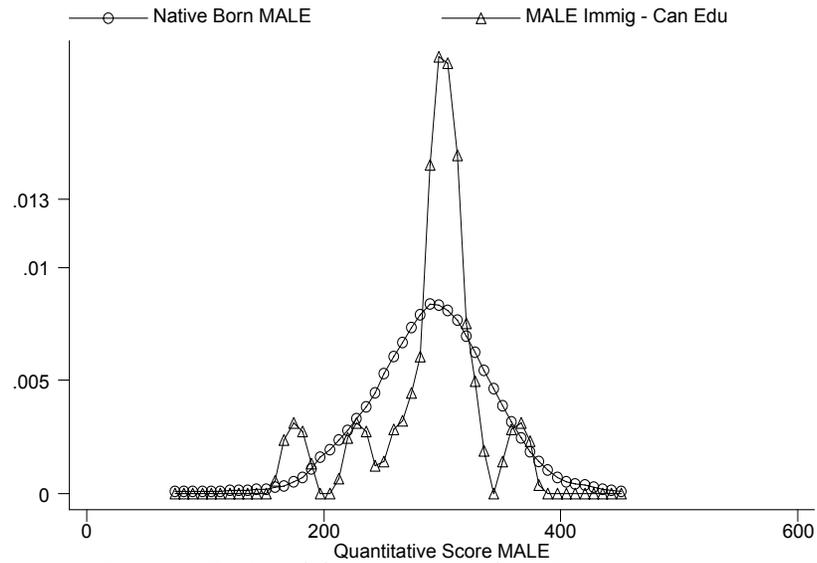


Fig.2(a) Distr. of Quantitative (Can Edu)Males

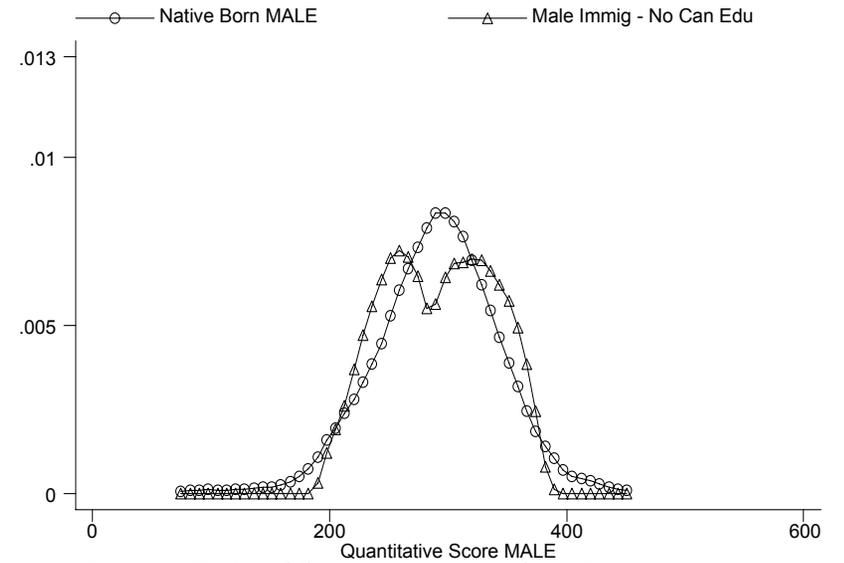


Fig.2(b) Distr. of Quantitative (No Can Edu)Males

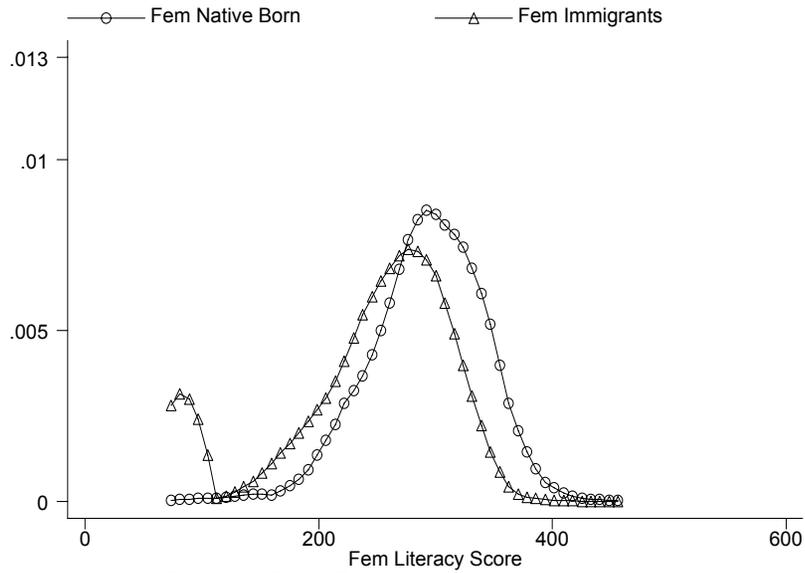


Fig.1(a) Fem Distribution of Literacy

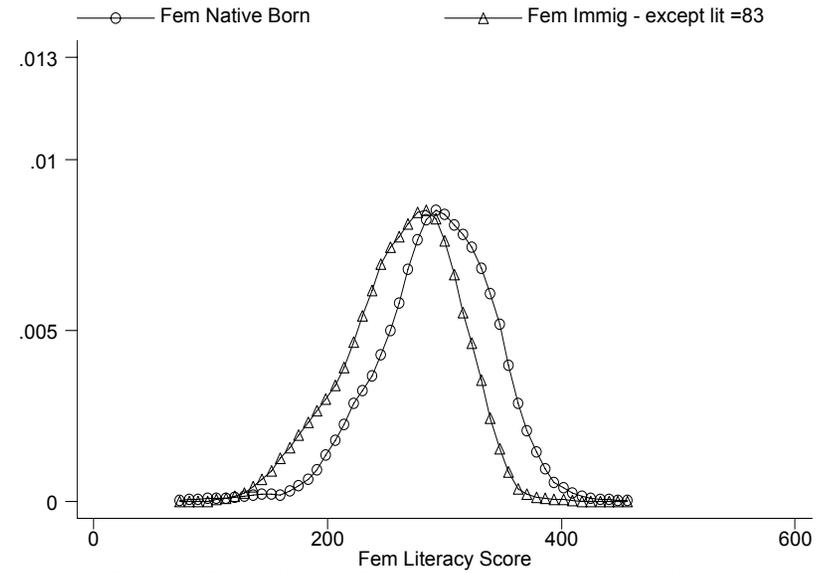


Fig.1(b) Fem Distr. of Literacy (except q = 108)

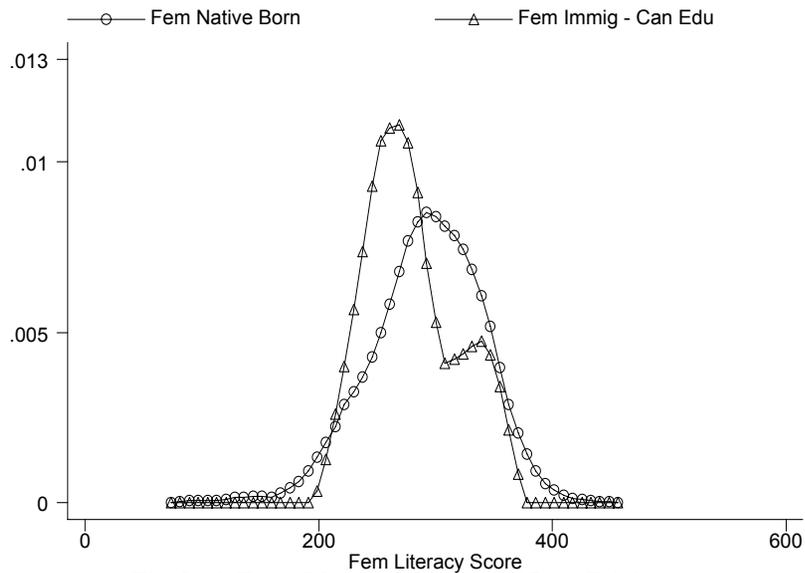


Fig.2(a) Fem Distr. of Literacy (Can Edu)

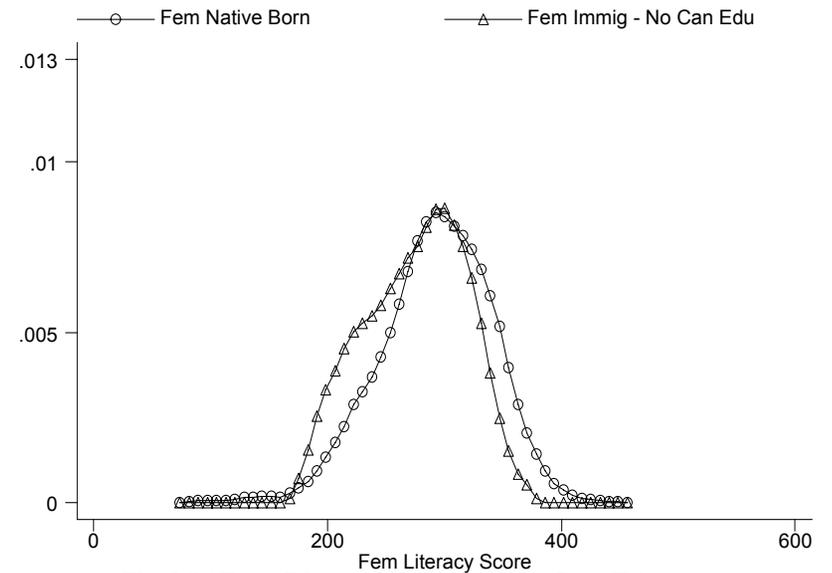


Fig.2(b) Fem Distr. of Literacy (No Can Edu)

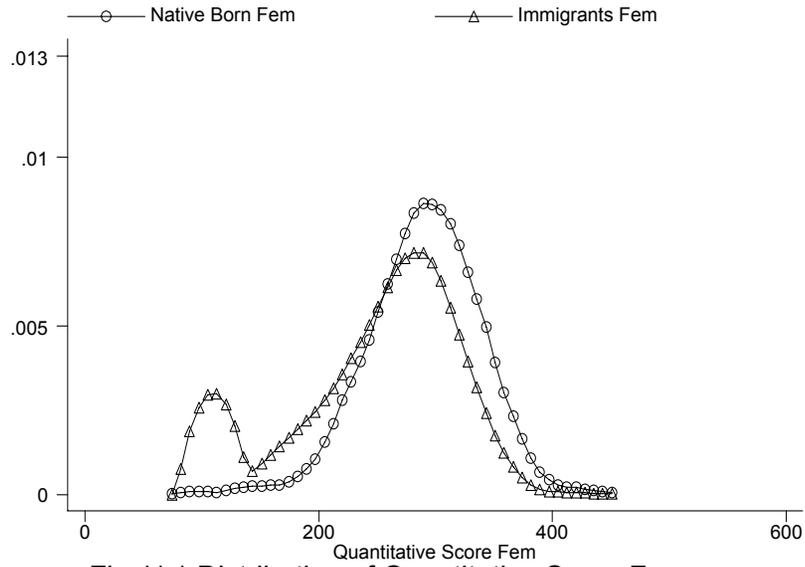


Fig.1(a) Distribution of Quantitative Score Fem

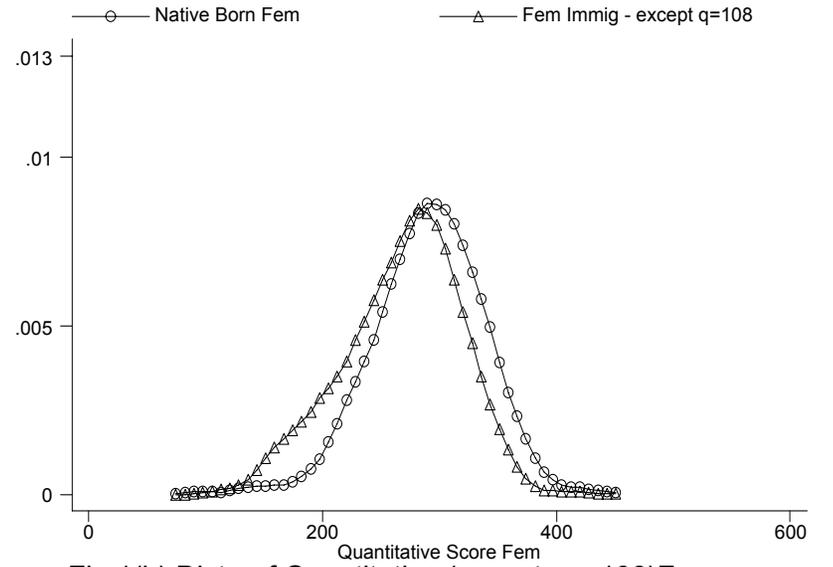


Fig.1(b) Distr. of Quantitative (except q = 108)Fem

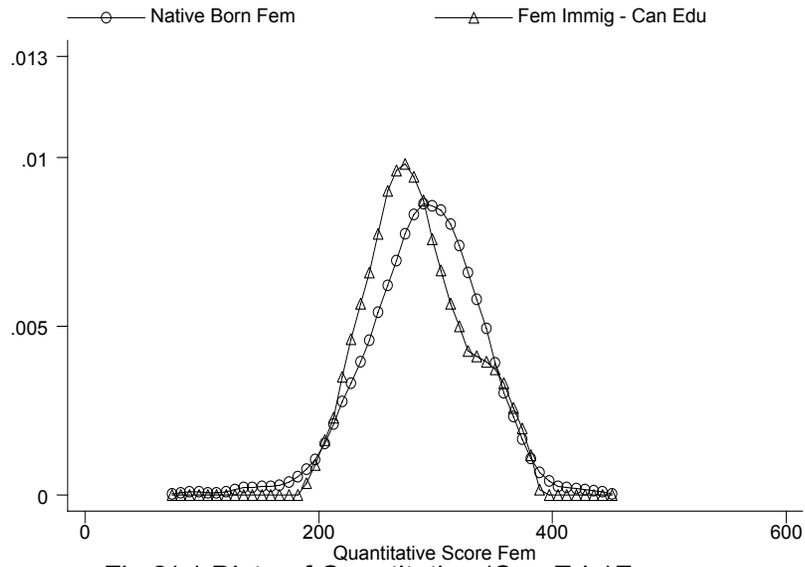


Fig.2(a) Distr. of Quantitative (Can Edu)Fem

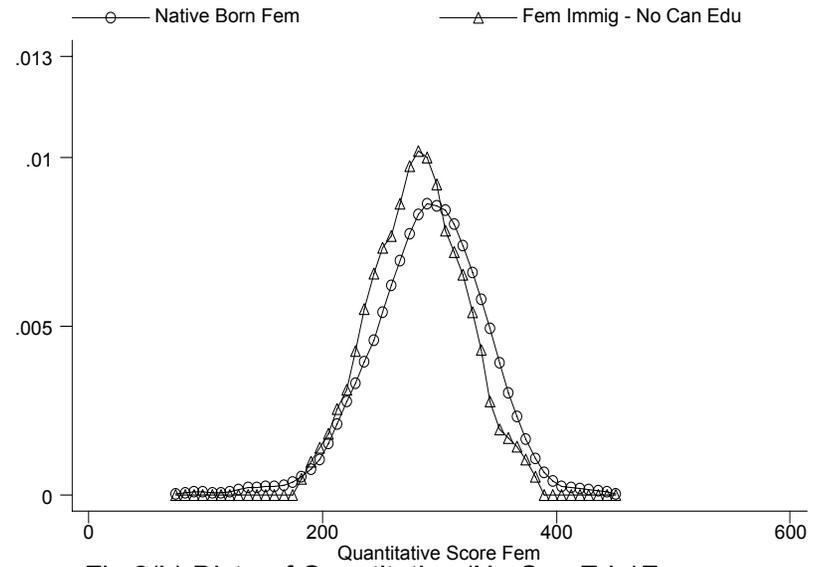


Fig.2(b) Distr. of Quantitative (No Can Edu)Fem

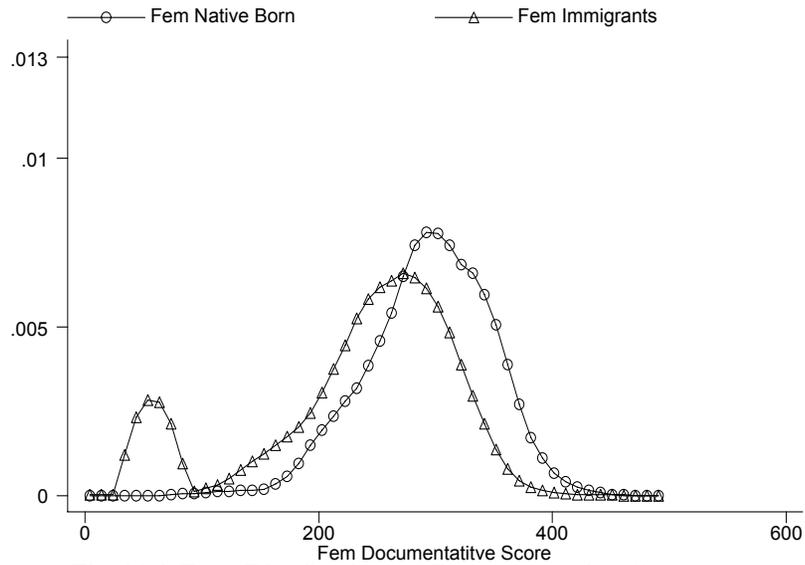


Fig.1(a) Fem Distribution of Documentative Score

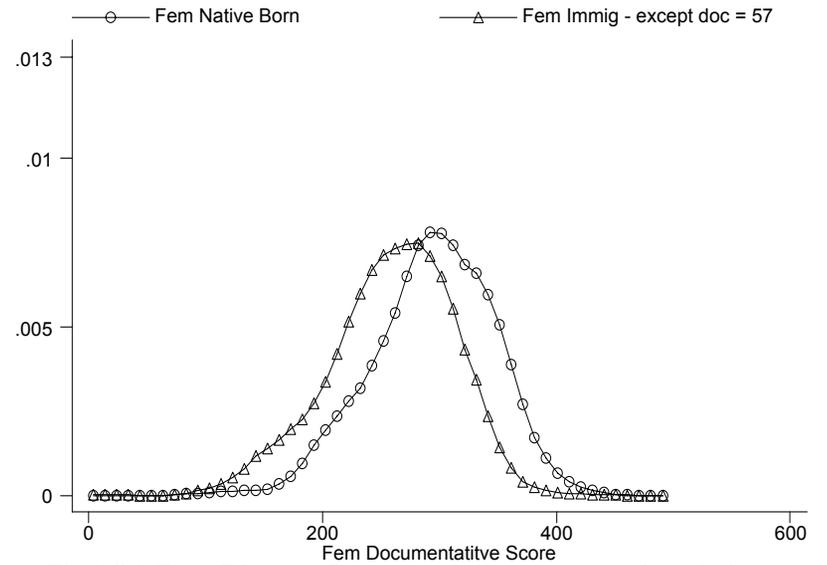


Fig.1(b) Fem Distr. of Documentative (except doc=57)

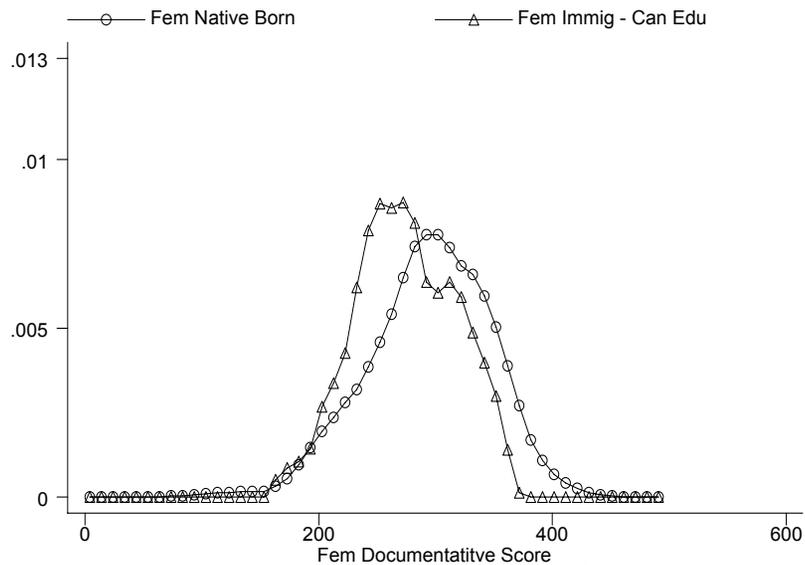


Fig.2(a) Fem Distr. of Documentative (Can Edu)

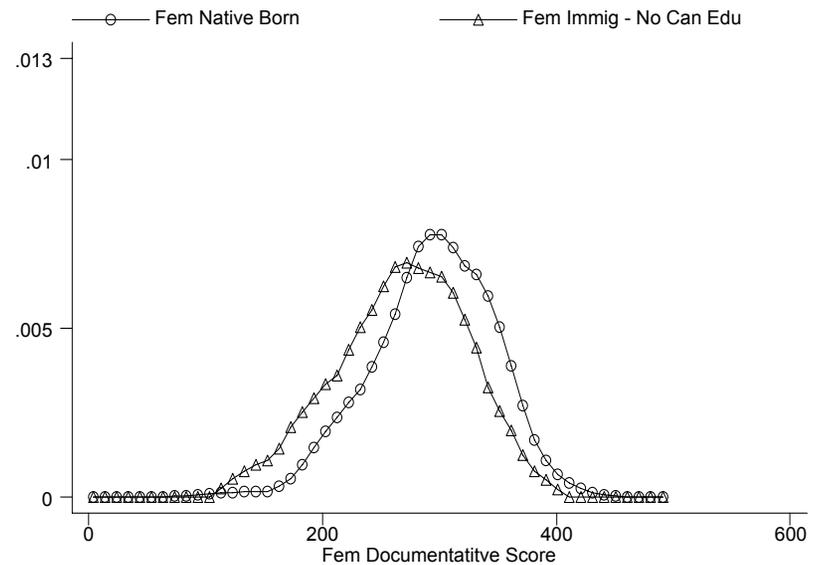


Fig.2(b) Fem Distr. of Documentative (No Can Edu)

