Age at Migration, Language and Fertility transitions among Migrants to Canada

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Abstract

This paper explores the fertility decisions of Canadian immigrants using the 20 percent sample of the Canadian Census of Population for the years 1991 through 2006. We focus on those migrating as children, to assess the process of assimilation in terms of fertility. Our analysis shows that the sharp discontinuities by age at migration that are typically observed regarding the effect of assimilation on education or labor market outcomes are not present in fertility outcomes. Rather, there is an inverted U shape relationship between age of migration and immigrant fertility, with those migrating in their late teens having the highest fertility rates when compared to the Canadian born. We find that this pattern occurs for all countries of origin, although at different paces. Further, language acquisition does not seem to be the key mechanism though which age at immigration affects fertility – fertility behaviour of immigrants with an official mother tongue also differs from that of natives. School integration, however, could be a channel through which age at immigration affects fertility.

JEL code: J13

1. Introduction

In this paper we study fertility behavior of immigrant women as compared to the childbearing patterns of women born in Canada. The overall importance of fertility decisions on several dimensions of household well-being is generally recognized, including their effect on education and labor market participation choices. Specifically, the analysis of immigrant fertility differentials will help understand the socio-economic integration of immigrant women and the changing shape of family structure in immigrant recipient countries. In addition, immigrant fertility analysis is central to projecting the future demographic structure of immigrant recipient countries in order to assess the sustainability of generous welfare policies burdened by increasing age-dependency ratios and by demographic pressures on social services as the baby-boom generation retires (Belanger et al. 2005; Coleman 2006; United Nations 2000).

Between 1990 and 2000, the annual number of births in Canada declined by 19%. The reduction in births is partly attributable to the aging of the population, with the large cohorts of the baby-boom gradually moving out of their fertile years, and partly attributable to changes in the reproductive behavior of the Canadian population. The total fertility rate (TFR) — that is, the average number of children that 1,000 women would have if, throughout their reproductive life, they had the fertility observed in a given year — has been falling steadily for nearly a decade, being 13% lower in 2000 than it was in 1990. One of the changes in fertility behavior affecting this trend is that the fertility of younger women (under 30 years of age) is decreasing, whereas the fertility of older women is only slightly increasing. Although variations in total fertility rate may only reflect year-to-year changes in conditions affecting fertility, the reduction in fertility among current cohorts during their earlier years seems too large to be compensated by higher fertility later in life.[1]

These demographic trends were partly behind the current immigration policy in Canada whose aim is to maintain labor force growth (Green and Green, 1994). As a result of this policy, the immigrant population, as a percentage of total Canadian population, has almost doubled between 1980 and 2006. Estimates from the 2006 Canadian Census indicate that 20% of Canada's population is foreign born and that another 13% are the children of foreign born parents or second

[1] A proper analysis of fertility should look also at the completed fertility rate, which measures the actual number of children born to women who have completed their fertility. During the baby-boom, the TFR greatly exceeded the completed fertility of the corresponding cohorts because it was, in part, swelled by the acceleration of the tempo. By contrast, since the late 1960s, the completed fertility rate of the cohorts has been greater than the corresponding TFR

generation Canadians. The demographic contribution of immigrants is not, however, limited to the direct effect on population counts. Although the fertility of foreign-born Canadian women was formerly lower than that of women born in Canada, it is now higher.[2] Overall, the fertility rates of both groups have diminished since the 1970s, but the fertility of Canadian born women has fallen by 35%, whereas that of foreign born women fell by only 12% between 1976 and 2000. This is partly attributed to the change in the composition of source country of immigrants. Today's immigrants tend to come from countries with higher fertility (South Asia and Latino America) and they seem to retain, at least for a time, some of the fertility behavior observed in their country of origin.

From a purely demographic perspective, a better knowledge of different groups' fertility behavior could be used to develop scenarios for future population projections. The higher fertility of recently arrived immigrant women is one of the few factors that could support a possible rise in Canadian fertility in the short run.

We believe, however, that the importance of understanding the fertility decisions of immigrant households goes beyond demographics. Fertility decisions are closely related to human capital investment and labor market decisions and, as such, have a profound impact, not only on the overall well being of immigrant families, but also on the integration of female immigrants themselves. Further, it could have long reaching consequences if it helps perpetuating traditional gender roles within immigrant households.

This paper looks into the fertility decisions of Canadian immigrants using the confidential files of the Canadian Census of Population for the years 1991 through 2006. We use age at immigration to measure fertility assimilation of immigrants to the Canadian norm and find it to have a distinct influence on immigrant fertility. In particular, it shows an inverted-U shape relationship with fertility. There is no evidence of a discontinuity in this relationship, which is typically found when looking at the effects of assimilation on education, earnings and employment. This pattern of assimilation is present in immigrants from different broad cultural backgrounds. Further, our analysis suggests that language is not likely to be a barrier in fertility assimilation, but rather fertility assimilation seems to be associated with education decisions.

The next section of the paper reviews recent findings on fertility behavior and assimilation of immigrants that inform our analysis. We then describe the data employed and the empirical

[2] The fertility of immigrant women has overtaken that of Canadian born women since the early 1980s

strategy followed, discuss the estimates of the fertility behavior of Canadian immigrants as compared to the Canadian born, and show estimates on fertility assimilation. We conclude with some general comments about the findings and future research.

2. Fertility Behavior of Immigrants

Fertility behavior likely plays an important role in many dimensions of immigrant well-being, as fertility rates shape the socio-economic assimilation and mobility of immigrant women. Individual investments in human capital usually require postponement of fertility, and employment opportunities and career advancement tend to become too costly for women with a large number of children.[3] Therefore, high (and early) fertility may hinder the socio-economic integration of immigrant women, perpetuating more traditional gender roles within immigrant households. Improved economic opportunities in Canada compared to those in the country of origin and interaction with the Canadian-born may, on the other hand, affect the fertility preferences of immigrants. Alternatively, even if childbearing preferences remain the same, the new environment that immigrants face in Canada, both in terms of opportunities and of costs, may alter their ultimate fertility decision. Immigrant women may find more labor market opportunities than in their countries of origin and decide to reduce/postpone fertility in order to work. Or it may be the case that, in the absence of informal child care provided by relatives, immigrant women find formal daycare expensive and, as a result, they decide to trade off children for work (Galor and Weil, 1996). Further, given the trade-offs faced in terms of time and resources within households, the ultimate choice of more children over potentially more resources devoted to the rearing of each child may have repercussions on the well-being of the second generation of immigrants.[4] For instance, Blau et al. (2008) find that in the United States second-generation women's schooling levels are negatively affected by the average fertility of immigrants of their parents' descent.

Models of fertility adjustment try to explain the fertility experiences of adult immigrants. For instance, the *assimilation model* suggests that couples migrating from a country with higher fertility rates will initially follow their own country's fertility patterns and will only gradually adjust to the fertility rates of the host country. In the short run, however, fertility may follow the

[3] Adsera (2004) shows the connection between labor market institutions and fertility using evidence from Europe.

[4] The trade-off between quality and quantity of children is outlined in Becker (1981).

disruption model, which postulates an initial drop in couples' fertility around the time of migration and a fertility rebound later on (Blau 1992; Kahn 1994). The two models can be combined, and it may be possible to observe an initial drop in fertility at the time of immigration, followed by a subsequent rise in fertility that gradually declines to converge to the host country levels.

Results from the empirical investigation of immigrant fertility are mixed. Blau's influential study (1992) seems to support the disruption model regarding short run fertility adjustment of immigrants in the United States. Current research is more focused on long run fertility adjustments. For instance, Parrado and Morgan (2008) find compelling empirical evidence of fertility assimilation for Hispanic women in the United States. In Canada, fertility studies show that up to 1980 Canadian immigrants had lower fertility rates than the Canadian born (Kalbach 1970), but the trend has since reversed. Ng and Nault, (1997), and Ram and George (1990) find evidence of short lived fertility disruption upon immigration and quick convergence to domestic born fertility levels with socio-economic assimilation.

Part of this change is likely due to the change in the composition of immigration during the past 30 years in Canada. Before 1980, the majority of immigrants came from the United States or Europe (41%). By 2006 this fraction was down to 19 percent of recent arrivals (those arriving within the last five years). Currently, immigration from Asia constitutes 58% of recent arrivals versus 34% of all those who arrived before 1980, and twice as many recent newcomers are from Africa as there were before 1980. The increase in immigration and the change in its composition have originated an extended literature documenting the economic performance of recent immigrants and how well they assimilate into Canadian labour markets.[5] Regarding fertility, Belanger and Gilbert (2003) suggest that the shift in the source country composition of immigrants is likely to be responsible for the change in fertility patterns, as more immigrants from the Middle East, Southern Asia and Latino America, areas with traditionally high fertility rates, arrive in Canada.

These models of fertility adjustment, however, apply to adult immigrants. It is less clear what fertility patterns to expect from those who immigrate as children. As suggested in Fernandez and Fogli (2006), the assimilation process may take more than one generation to accomplish. If adaptation to the host country fertility levels takes place only gradually, even those arriving very

[5] See, Aydemar and Skuterud (2005) and Ferrer, Green, and Riddell (2006) and Picot and Hou (2007) among others.

young will be influenced by their parents' culture regarding fertility and exhibit fertility patterns closer to those of their ancestors than to the native born. On the other hand, it could be the case that fertility assimilation is a relatively rapid process and child immigrants integrate in the host country through schools and peer groups adopting the same fertility patterns of the native born, foregoing those of their parents. In this regard, the literature on immigrant assimilation has long recognized age at immigration as a decisive variable for understanding the process of assimilation of immigrants in many socio-economic dimensions (Chiswick, 1991). The earlier the immigrant arrived in the country of destination, the more likely she is to understand and adopt the rules and institutions that govern its socio-economic life. In addition, age at immigration may matter beyond the time of exposure if there is a critical age at which an individual is able to learn particular behaviors or skills, such as the local language (Bleakley and Chin, 2010); Beck, Corak and Tienda, 2008; Schaafsma and Sweetman, 2001).

In our analysis we will focus on the fertility assimilation of immigrants arriving as children or young adults (before the age of 18). We are interested in assessing the importance of age at immigration for fertility behaviour and learning whether there is a discontinuity in fertility assimilation similar to that observed when studying assimilation into labour markets or educational systems.

3. Data and Empirical Approach

Both the number of children women have and the timing of childbearing over their fertile life are important dimensions of the analysis of fertility behaviour. In this paper we focus on the total number of children born to women aged 16 to 45, conditional on their migration status as well as on a set of additional independent variables.

Ordinary least squares is not an appropriate method to estimate variation in event count dependent variables such as the number of children. Event count models, such as Poisson, measure how often an event – in this case, having a child – occurs over a given time interval. We use the following Poisson regression model to estimate fertility.

$$F_i = e^{\beta Ii + \gamma Xi} + \varepsilon_i \qquad (1)$$

where F is the measure of fertility of female i (in our case, total number of children), I is an immigrant indicator, X is a vector of individual characteristics, including age, presence of additional members in the household, geographic location, socio-economic status of the

household, or cultural/religious background, and ε is the error term. Since we observe respondents of different ages, we control for their exposure time to fertility (defined as age minus 15 years) in our models. In general, coefficients from non-linear models have no immediate interpretation. For this reason we report in the tables the incident rate ratios (IRR). In the most parsimonious model, we are interested in comparing the predicted fertility rate (or fertility incidence) between two observations that differ only in that the variable I_i takes on a value of 1 for immigrants and 0 for the Canadian born. The ratio of these two incidence rates is given by

$$IRR(I_i) = \frac{E(F_i \mid I_i = 1) = exp(\hat{\gamma}X + \hat{\beta}(1))}{E(F_i \mid I_i = 0) = exp(\hat{\gamma}X + \hat{\beta}(0))} = \exp(\hat{\beta}) \qquad (2)$$

Equation (2) states the effect of a one unit change in the independent variable on the relative incidence rate of fertility. In the case of indicator variables such as our immigrant indicator *I*, the relative incidence rate can also be interpreted as the fertility rate for immigrants relative to the Canadian born.[6]

The data in the paper comes from the confidential files of the Canadian Census of Population (20% sample) for the years 1991, 1996, 2001, and 2006. Confidential census data have the advantage of providing large samples necessary to perform robustness analysis of the estimates. They also include more detailed information on individuals, as well as a richer categorization of relationships among members of the household than it is regularly available. With this detailed information, we are able to link individuals within the household and to compute the number of children of each woman living in a household. From each census year, we select all women between 16 and 45 years of age, except for aboriginal individuals, and gather information on age, education, marital status, number of children (in the 1991 Census), number of children living in the household, province of residence, religion (1991 and 2001 Census) and immigrant status. In addition, for immigrant women we collect their year of immigration, age at immigration and country of birth.[7] To reduce computing time to a reasonable length, each year we select all immigrants plus a 20 percent random sample of domestic born individuals and weight observations accordingly. The four censuses are then pooled, resulting in approximately 1,800,000 observations.

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[6] Similarly, in the case of a continuous variable such as age, the IRR could be interpreted as the increase in fertility rate when age increases by one year.

[7] We have grouped the information for country of origin into 20 relatively homogenous groups. These are listed in Table B in the appendix.

In general, vital statistics are the most accurate source of information for fertility records in developed countries. However, since they only contain little additional information about the individual and the household, they are inadequate for an in-depth analysis of fertility behavior. For this reason, an alternative method is generally used to indirectly estimate fertility from survey information such as Census data, which typically reports the number of children living in the household. The method, known as the "own children method", exploits the fact that the vast majority of young children live with their mother at the time of the census. Since the date of birth of both mother and children is known, it is easy to reconstruct each woman's fertility history.

In line with these studies, we use the number of children living in the household as our measure of fertility in the analysis that follows. To the extent that some children may not live with their mothers, our dependent variable may be measured with some error.[8] To reduce this problem, we restrict our sample to relatively young women (up to 45 years of age) whose children are more likely to live at home. Still, there are several caveats to the measure. First, the census questionnaire asks respondents to include children in joint custody who live most of the time in a household as household members. Therefore, we will miss all the children who are living only with their father. To the extent that young children are far more likely to live with their mothers, even after marriage disruption, this will not be too important.[9] Second, it may be difficult to properly capture the very early childbearing of older women in the sample as some of their children may have already left home. That should be a concern particularly if the departure of children from the household in their late teens or early adulthood (e.g., attending college far from home, earlier marriage or cohabitation) occurs at a differential rate between immigrants and the Canadian born.

To assess the importance of the potential bias introduced by our dependent variable, we undertake three types of robustness exercises. First, we use the total number of children ever born, available in the 1991 census, to re-estimate the models and compare the results with those obtained for the 1991 Census using our fertility measure. Second, we further restrict the sample to

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[8] Belanger and Gilbert (2003) show that estimated fertility differentials for immigrants and domestic born individuals for the period 1996-2001 using both methods are not very sizeable – with a downward bias of the census for women younger than 30 and an upward bias for those aged beyond 30.

[9] In some instances, several women live in a household with children and we cannot be certain of which one is the mother of the children. This happens, for example, when the children are reported as grandchildren of the head of the household and there is more than one daughter of the head of the household living in the household. This is not, however, a common occurrence.

women up to age 40. This reduces the likelihood that some children have already left home but it misses late childbearing, which may in turn be differentially important among groups (e.g., according to education, country of origin, etc). However, Vezina and Turcotte (2009), after comparing data from the Canada Census and from the General Social Survey, note that there is no appreciable bias in the characteristics of the fraction of women aged 40 to 44 who have a child aged five or over based on whether some of the children live with them or not. Third, we re-estimate the models restricting the age of the children included in our fertility measure to those 18 and under. Differences in the results when using this definition of the dependent variable will indicate that the bias introduced by the own children method is important. The overall pattern of the results and the estimated coefficients are quite robust across these different samples and specifications. These are available upon request.

(Table 1 here)

Table 1 shows summary statistics of the main variables separately for Canadian born and for immigrants. The first two columns correspond to the whole sample over the 1991, 1996, 2001, and 2006 censuses. In order to provide a sense of the temporal variation in the data over the sample period, the table also includes statistics for 1991 and 2006 separately. On average, immigrants have more children than the Canadian born and for both groups the average number of children diminishes by approximately 15 percent between 1991 and 2006. Immigrants in the sample have higher educational attainment and are generally older than the Canadian born. The age difference may account for part of the gap in mean fertility observed between both groups. More immigrants are married -- or living together under common law (CL) -- than Canadian born. Between 1991 and 2006, the percentage of married/CL individuals fell for both groups (around 9 points for Canadian born and 4 points for immigrants), while the fraction of single individuals increased by a similar magnitude in each case. Finally, fewer immigrants with children live in households with additional family members besides their spouse than Canadian born (3 percent versus 8 percent, respectively). The average immigrant has been in Canada about 13.4 years and arrived at the age of 19.5. Around 50 percent of the individuals arrived in Canada as adults, past the age of upper secondary schooling. Figure 1 presents the distribution of ages at migration for the sample. After a small spike for toddlers, the fraction of entrants remains more or less flat until

reaching its peak between the ages of 20 and 30.[10] The fraction of recent immigrants over the whole pool has increased in the latest Censuses and current immigrants arrive at a slightly older age than in the past. Further, immigrants are increasingly arriving from countries in Asia and Africa rather than from Europe. Consequently, the fraction of immigrants with a non-official mother tongue, or that of immigrants using a non-official language at home has steadily increased over the period 1991-2006. These trends, which are likely to have an impact on fertility behaviour, are well documented in the Canadian literature of immigration (Picott and Sweetman, 2005).

(Figure 1 here)

Table 2 shows the mean number of children living at home by Census year and selected characteristics for women aged 16 to 45 in each census. The mean is higher among immigrants than Canadian born, although both groups display a similar diminishing trend over time. We show mean number of children by "years since migration" for each Census year to offer a rough idea of how immigrant fertility patterns evolve over time. In 1991, recent immigrants (those with less than five years in Canada) had on average less than one child (0.88). In the 1996 Census, the same arrival cohort of immigrants, having already spent six to ten years in Canada, had slightly over one child (1.06), and around 1.08 in 2001, after having lived in Canada between 11 and 15 years. Table 2 easily shows that the mean number of children of previous arrival cohorts of immigrants was higher than the 1991 arrival cohort at any point in time, while that of those who entered Canada after 1991 was lower. Regarding age at immigration, women immigrating at a young age have a similar or even lower number of children than Canadian-born females, while those immigrating later in life have more. Finally, as expected, fertility behavior is highly correlated with cultural norms regarding fertility in the source country (Blau et al. 2008; Fernandez and Fogli 2006; Ford 1990; Khan 1994).[11] Immigrants from Europe (except Eastern Europe, the UK and Ireland), Mexico, Central America, Middle East and North Africa have substantially more children than Canadian born women.

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[10]The distribution varies substantially by country of origin. If immigrants from Europe or the United States are removed from the sample, the distribution of immigrants by age at immigration resembles more a normal distribution centered at the early twenties.

[11] Nonetheless, some migrants arriving in Canada will likely have better access to contraceptive methods during the remaining years of their fertile life than in their country of birth. That should affect their ultimate fertility, independently of their cultural heritage.

(Table 2 here)

4. The Fertility of Young Immigrants

The estimates we report in the tables and graphs of the following sections correspond to relative fertility rates of immigrant females as compared to those of Canadian born females. Models include controls for age, marital status (single, married/CL, or divorced/separated), province of residence, non census metropolitan areas of residence, and highest educational attainment. In order to control for the decrease in fertility over the period, we include dummy indicators for each census year. These control variables consistently show the same effect on fertility across all specifications. Fertility increases with age until women reach their late thirties, and then it plateaus. Fertility rates are higher for married/CL and previously married/CL women and for the least educated. Although we do not report all control variables in the tables, they are available upon request.

There is some controversy in the literature about whether or not it is appropriate to include controls for income in fertility analysis. Income measures reflect the respondents' decisions to enter the labor force. Fertility and labor market decisions (which ultimately affect income) are so intertwined that it is not realistic to regard them as exogenous to one another. Females with strong preferences for work may also have low preferences for child rearing, and this may introduce selection bias in our estimates. The direction of the bias is not straightforward. To the extent that children are a normal good, females with more income may have more children, since they can afford to pay for the extra services involved in raising children. However, women may have higher incomes precisely because they reduced or postponed their fertility. Overall, considerations of joint labor market and fertility decisions require special modelling that is beyond the scope of this paper. For this reason we have decided not to include income controls in our analysis. Note, however, that the inclusion of education and marital status in the analysis captures some important dimensions of economic well-being and to some extent help us to control for income.[12]

Our initial set of estimates of immigrant fertility rates is reported in the first regression of panel A of Table 3.[13] The basic model includes, besides the controls specified above, only an indicator for immigrant status. We report in the first column the relative fertility rate of an

[12] We have computed all regressions without controlling for education or marital status and patterns remain unchanged.

[13] A Chi2 test does not reject the null hypothesis that the data are indeed Poisson distributed.

immigrant over a Canadian born woman, keeping constant other factors. Immigrant females have significantly higher fertility rates than the Canadian born – around 1.10 times higher, or immigrants have, on average, 10% percent more children than the Canadian born, after taking into account other factors.

(Table 3 here)

4.1 Understanding fertility assimilation: Age at Immigration

Studies on immigrant outcomes generally place significant emphasis on assimilation. Immigrants may initially differ from the native-born population because they have different preferences or different endowments. As immigrants spend time in the host country, they may develop different preferences or change their endowments. This in turn will affect their choices and (plausibly) make these closer to those of the native born. This is typically measured by introducing in the analysis a variable such as "age at immigration", which provides a sense of how the outcome of interest varies depending on how long the immigrant has been exposed to the local environment.

In addition, age at immigration may also affect a given outcome if there is a critical age after which the immigrant will not be able to learn a particular behavior or skill, such as being fluent in the local language. Bleakly and Chin (2008), identify that there is a critical age, around 8 or 9 years of age, after which the outcomes of immigrants systematically differ from those of the native born; Beck, Corak and Tienda (2010) show that immigrants arriving after age 12 are increasingly less likely to obtain a high school diploma. In the case of fertility, there could be an age at which fertility assimilation is difficult because cultural norms regarding fertility are already formed (for instance, the onset of puberty). This could be reinforced by the existence of taboos associated with sexual behaviour, contraceptive methods, the role of women, etc that make difficult to learn alternative views regarding fertility behaviour. We will introduce age at immigration to see whether such a discontinuity exists affecting the fertility behaviour of child immigrants.

We focus on immigrants arriving as children (immigrating before 18 years of age) because we are interested in the assimilation of the cultural norms regarding fertility, which are more likely to occur during childhood and young adulthood before the age of average family formation. Further, the decision to immigrate before the age of 18 is likely to be exogenous and independent of

decisions on other variables affecting fertility such as labour market participation, education decisions or family formation. Those immigrating at an older age are more likely to make this decision jointly with others (labour market, education and fertility decisions). Nevertheless, the sample includes all migrants regardless of age at arrival and the model includes yearly separate indicators for age at immigration up until age 25 and then an additional indicator for all those who migrated after age 25 to compare the patterns of child immigrants to those of young adults, where most of these other decisions are made. Table 4 shows the results of such regression, where we used a full set of indicator variables for each age at immigration. In the first column, no information on place of birth is included. Individuals arriving before age 2 are indistinguishable in fertility outcome from natives. However, in the second column, once dummies for different places of birth are included, the estimated relative fertilities for all ages of arrival are significantly different from 1 (the baseline for native born). The two estimate fertility rates are shown in Figure 2. Table 1A in the appendix includes the estimates of all the differente places of birth from the second column in Table 4.[14]

(Figure 2 here)

What is surprising from figure 2 is that it shows no evidence of an obvious discontinuity by age at immigration in the fertility of immigrants. Rather, fertility increases rather gradually with age at immigration until the middle teens, then at a faster pace during the late teens and early twenties, after which it diminishes. Immigrants arriving older than 25 years have, on average, 7% higher fertility rates than the native born.[15]

Fertility preferences are greatly influenced by social attitudes toward fertility, contraceptive measures, gender preferences, and out of wedlock childbearing, among many others that are part of individual's cultural background. We try to account in part for these differences in cultural background by controlling for the woman's area of origin. Further, given the changes in the composition of immigration to Canada documented in the introduction, this is an important part of the analysis.[16] In this regard, the estimates in the second column of table 4 are net of the influence

[14] The reference category for place of birth indicators corresponds to those born in the USA. Changing the reference category will shift the predicted fertility rate by age at immigration accordingly.

[15] Further, the result is not driven by intermarriage, as could be the case if those immigrating at a younger age are also more likely to intermarriage and adjust their fertility to that of the native born. Immigrants in mixed marriage (married to native born Canadians) also show this pattern.

[16] Until the 1981 Census, the majority of immigrant women with children under five were originally from Europe. However, Asian immigrant mothers overtook all other continents in the 1996 Census for this category. In our sample,

of cultural preferences for fertility, as estimated through area of origin. This way we also isolate the effect of the changing composition of the source country of immigration over the census years.

Area of origin has already been shown to be relevant in explaining variation of fertility outcomes in different contexts. Anderson (2004), for example, finds important differences in levels of childbearing propensities between women from different countries of origin among migrants to Sweden from the 1960s to the 1990s. More recently, Georgiadis and Manning (2009) analyze Muslim assimilation (Pakistanis and Bangladeshis) into British society as compared to other migrant groups in different dimensions that include fertility. Similar research for the United States has been undertaken by Kahn (1994) and Parrado and Morgan (2008), among others. The majority of these studies report substantial differences in fertility by ethnicity, although these tend to convert for the second generation. It is important to note that policies in the country of arrival that affect the expectations of the extent and the pace at which newcomers have to become part of the culture may play a role in the speed at which those behaviors adapt. For example, multiculturalist movements that encourage cultural continuity of newcomers could potentially deter the assimilation to the receiving culture. In other instances, policies in the country of origin either pro-natalistic (e.g., Ceceascu's regime) or restrictive (e.g., China's one child policy) may have shaped fertility of migrants before their arrival in such a decisive way that their behavior in the country of destination reflects a readjustment of their preferences after breaking free of policy constraints.

As noted, we show in table 1A the estimates corresponding to place of birth from the second column in Table 4 (and Figure 2). Immigrants from the Caribe and Central America have high fertility rates, particularly among immigrants from Mexico, with fertility rates around 1.4 times higher than the Canadian born. Other immigrant groups with high fertility rates are from Africa (except South Africa), the Middle East, and Southern Asia. Eastern European immigrants, as well as those from elsewhere in Asia, have relatively low fertility rates in comparison. Chinese

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and throughout the census years, around one-fifth of the immigrants were born in the American continent (Table 1), 6% in the Middle East, and 1% in Pacific countries. The share of Europeans moved down from 41% in the 1991 Census to only 23% in the 2006. Conversely the share of Asian and African countries moved up from 30% and 5%, respectively, in 1991 to 44% and 8% in 2006.

immigrants show the lowest fertility rates of all groups, only 0.78 times that of the Canadian born.[17]

(Figure 3 here)

The question that rises then is whether all immigrants follow the age at immigration pattern described or whether there are substantial differences between groups. To answer this question we have interacted place of birth with age at immigration groups. We have categorized age at immigration into five groups: those immigrating as pre-school children (aged five or less at the time of immigration), those immigrating as elementary school children (aged 6 to 11 at the time of immigration), those immigrating in their early teens (ages 12 to 15) and likely to enter school in junior high school, those immigrating in the late teens, between ages 16 to 19) and still highly likely to receive Canadian schooling, and finally those immigrating at 20 years of age or older. Our categorization according to ages at which the child is more likely to enter different levels of school is intended not to mix the effect from age at immigration with the potentially different effects of entering different school levels. While elementary schools tend to be smaller and local, high school institutions are often larger and can be further away from the child's neighbourhood, particularly in large cities. In addition, social interaction among children changes with age and the type of school institution the child attends (Khmelkov and Hallinan, 1999). Hence, this characterization ensures that the effect of immigrating at a given age is not representing a mixture of different effects coming from children in the group being in different school levels. This would be the case if we consider those immigrating between ages 10 and 15, for instance, where some children will still be in elementary school, and others would be in junior high school. If the effect of entering in different schooling institutions at the time of migration may affect the perception of Canadian culture and consequently assimilation, this classification avoids this problem.

Figure 3 shows the cumulative effect of the interaction between the age groups and broad areas of origin (US-Europe, Middle East, South Asia, Other Asia plus the Pacific, Africa and South America). All places show the same increasing pattern with age at immigration that peaks in the late teens. The difference is one of levels. Immigrants from the Middle East and South America show high fertility rates even if arriving at a young age (approximately 20% higher approximately than the native born), while immigrants from Africa and South Asia have

[17] The predicted fertility of a representative mother in the most prolific groups is well above the replacement level of 2.1, and that of the whole population of immigrants (1.85)

relatively low fertility rates if arriving young (10% lower than the native born) and immigrants from the rest of Asia have very low fertility rates if arriving young (20% lower than the native born). These patterns seem to suggest that, unlike other types of immigrant assimilation, fertility assimilation is a relatively smooth process. However, cultural differences determine the extent of such assimilation. For most groups age at immigration implies assimilation in the usual sense, the younger they arrive to the country, the more similar their fertility is with respect to the native born. For other groups, particularly Asian immigrants from regions other than than South Asia, assimilation is reversed, as the older they arrive to the country, the more similar their fertility behaviour is with respect to the native born. The cumulative effect of the interaction between all areas of origin and age at immigration groups is shown in Tables 5 for more general groups of countries and 6 for more detailed areas of origin.

4.2. How does age at immigration work? Language barriers

When examining educational attainment or labor outcomes of young immigrants, fluency in destination country language plays a key role (see e.g. Kossoudji, 1988; Chiswick and Miller, 2001 and 2007; Dustmann, 1994; Dustman and van Soest, 2002; Bleakley and Chin, 2004). In the case of fertility, mother tongue may also impact the ability of the child-migrant to to form preferences about fertility using local cultural cues acquired through school and peer networks.

The literature has typically measured fluency by looking at mother tongue, the language that individuals first understood and they can still understand. Mother tongue and its distance to the official tongue, has proven to be important on labor market and education assimilation. For example, immigrant men coming from a country where the language spoken belongs to the same language family group as the destination country experience a 9% earnings premium over other immigrants (Adsera and Chiswick, 2007).

We introduce an indicator for whether the individual had an official mother tongue (OMT) in a province that primarily uses that official mother tongue.[18] If language barriers difficult the assimilation of local norms governing fertility, we would expect that immigrants whose first language was not one of the Canadian official languages to have different fertility behavior than those whose mother tongue was English or French.

[18] This is to account for the fact that although Canada recognizes two official languages (English and French), French is used mostly in Quebec, whereas English is generally used elsewhere. This definition of OMT has the problem that we know only where individuals reside at the time of the census. Using a standard definition of official mother tongue as "individual first spoke either French or English as a child" yields similar results

Model II in table 3 shows the influence of mother tongue on the fertility behaviour of immigrants. Among the native born, those who had an OMT have slightly higher fertility rates (3% higher) than native born Canadians who do not. This later group is mainly composed by the native born children of immigrants. The result agrees with previous findings in the literature reporting that the second generation of immigrants have on average lower fertility levels than their immigrant parents (Ferrer and Adsera, 2010). Immigrants who do not have an OMT have higher fertility than Canadian born individuals who do not have an OMT (14% higher). To better understand the interaction between immigrant and mother tongue indicators, we report in the first column of Panel B how the relative fertility rates of immigrants with an OMT compares to that of the other groups. The z-statistic of whether the difference between the groups is statistically significant is shown in column 2. Immigrants with an OMT have significantly higher fertility than the native born. More importantly, they have only slightly lower fertility than other immigrants (2% lower), suggesting that that having an OMT does not have a big impact on the fertility of immigrants.[19]

It could be the case, however, that the impact of OMT depends on age at immigration. This will happen if there is an immigration age after which language acquisition becomes problematic and this influences the assimilation of cultural norms regarding fertility. If language is the channel through which age at immigration affects fertility, we expect to see immigrants who have an OMT behave differently than other immigrants and more like the Canadian born. Further, we expect that very young immigrants, those arriving before the age of 5, will behave similarly regardless of the mother tongue, as they are unlikely to experience language difficulties in the assimilation of fertility behaviour.

Table 7 presents estimates from an interaction between the OMT indicator and the indicators for each age at immigration. The estimates are represented in Figure 4 and show that both types of immigrants follow a similar pattern. Immigrants who have an OMT also have increasing fertility with age at immigration relative to the native born. Further, immigrants who do not have an OMT show higher fertility rates than the native born, even if they arrive at very young ages.[20] The result suggests that language fluency is not a barrier in the assimilation of fertility. This is in

[19] 12.5% = exp (ln(1.034) + ln(1.143) + ln(0.951))

[20] This result is robust to considering English and French Mother Tongues separately.

contrast with what has been found in the literature of educational and labour market attainment which identifies language as barrier in education attainment and labour market performance.

(Figure 4 here)

4.3 Age at Immigration and Education

Age at immigration is likely to influence other variables affecting fertility. For instance, late age of arrival may limit integration into the school system, increasing the cost of acquiring higher education, and lower educational attainment is usually associated with higher fertility. To assess this possibility we look into the fertility of immigrants arriving at different ages conditioning on whether or not they attained a university education. We expect that if age at immigration affects fertility through education, immigrants with education will behave like similarly educated native born Canadians. Table 8 shows the results of interacting the age at immigration indicators with the university education indicator. The estimates, for university and non university educated immigrants, are represented in Figure 5.[21]

(Figure 5 here)

Figure 5 shows the fertility rate by age at immigration of immigrants with and without university education, relative to similarly educated native born Canadians. Immigrants without university education follow the same increasing pattern, even if immigrating at very young ages. Educated immigrants, however, have a much flatter profile, particularly in earlier years when integration in the Canadian school system takes place.

Although suggestive, this result has one shortcoming as it fails to account for the potential endogeneity of education decisions. It is possible that unobserved heterogeneity determines both education and fertility decisions. This is a serious problem that plagues most research concerning the fertility decisions of women, as most variables that determine fertility are likely to be choice variables themselves. Unfortunately, the conventional methods to deal with this type of selection bias usually require information that it is not available to us, such as longitudinal or panel data, or instrumental variables. However it is possible to assess the extent of this endogeneity by studying the outcomes for different groups. We have analyzed the effect of age at immigration on the

[21] Results are robust to different specifications of post secondary education that include college or other forms of post secondary.

fertility of university and non university educated individuals separately, and find that the patterns are almost identical to those described by figure 5. Results are relatively similar when we partition the sample among those with less than high school, high school and college. The difference in fertility with respect to natives appears only among those who did not finish compulsory education.

The results in this section suggest that education is an important determinant of fertility among immigrants. This seems to be true for all source areas of immigration showing fertility differences with the native born. In separate estimates, available upon request, we find that, immigrants from non western economies show large fertility differences between those that are educated (post secondary education) and those who are not. The largest differences correspond to Mexican and Central American immigrants, followed by those from the Middle East, Central and Eastern Africa.

6. Conclusions

In 2006, about two-thirds of total population growth in Canada was due to international immigration, which is currently the main contributor to Canadian labour force growth (70%). In the context of rising demographic dependency ratios due to low population growth and the aging of the baby boom generation, immigration is key to sustain current levels of public services ion Canada. However, for this strategy to success it is necessary that immigrants successfully assimilate into Canadian society.

In this context, the interplay of fertility and immigration rates has an important role in determining the future growth trajectory of Canada. Although high fertility rates among immigrants may help boost overall fertility rates, they can also hinder the economic assimilation of female immigrants and have repercussions for the economic wellbeing of immigrant families.

Our study shows that immigrant fertility is generally higher than that of Canadian born women, but not by much. We focus on the fertility assimilation of immigrant children and uncover a non linear relationship between fertility and age at immigration. Contrary to what happens with other immigrant outcomes where a sharp discontinuity in outcomes relative to natives is found around arrival at middle school ages, fertility increases continuously with age at immigration until the late teens and diminishes afterwards. This assimilation profile is present among immigrants coming from different cultural backgrounds, although the actual levels vary

with the country of origin. We rule out language as the mechanism through which fertility assimilation may happen. Fertility behaviour of immigrants with an official mother tongue also differs from that of natives. Education, on the other hand, appears strongly related to this pattern of fertility assimilation, which seems to occur only among less educated immigrants. University educated young immigrants behave like natives.

Even though not included in the paper we have also found similar results after controlling for language spoken at home, intermarriage, and language of spouse, among other things.

It would have been interesting to study how fertility "intentions" among immigrants of different backgrounds change with time on destination country. Unfortunagely census data does not provide this type of information.

Many questions are left unanswered to unveil the mechanism through which this nonlinear patters of assimilation occurs. Future research should focus on the endogeneity of educational choices and how they are tied it up with labour market and fertilityoutcomes

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TABLE 1. Summary Sample Statistics for Canadian Born and Immigrants

	All		1991		2006	
	CB	IMM	CB	IMM	CB	IMM
Number of children	0.84	1.10	0.89	1.18	0.77	1.03
Age	30.41	32.93	30.08	32.91	30.31	33.04
Education						
Less than HS	0.25	0.22	0.30	0.29	0.19	0.14
High school	0.28	0.26	0.30	0.28	0.27	0.24
Trades	0.09	0.08	0.09	0.08	0.11	0.08
Non-university post secondary	0.19	0.16	0.17	0.15	0.19	0.15
University-BA	0.16	0.23	0.12	0.16	0.20	0.31
Graduates	0.02	0.06	0.02	0.04	0.03	0.08
Marital Status						
Divorced	0.04	0.04	0.04	0.04	0.03	0.04
Married (+ common law)	0.54	0.64	0.59	0.67	0.50	0.63
Separated	0.03	0.03	0.03	0.03	0.02	0.03
Never married	0.39	0.28	0.34	0.25	0.44	0.29
Widowed	0.00	0.01	0.00	0.01	0.00	0.01
Mixed couples	0.12	0.20	0.11	0.23	0.12	0.18
Additional Family in Household	0.02	0.06	0.03	0.06	0.02	0.07
Years since migration	--	13.39	--	14.61	--	12.92
Arrived 0 to 5 years ago		0.27		0.25		0.28
Arrived 6 to 10 years ago		0.20		0.14		0.20
Arrived 11 to 15 years ago		0.17		0.16		0.20
Arrived 16 to 20 years ago		0.14		0.19		0.14
Arrived more than 20 years ago		0.23		0.27		0.19
Age at Immigration	--	19.56	--	18.32	--	20.14
Between 0 and 5 years of age		0.13		0.16		0.12
Between 6 and 11 years of age		0.13		0.13		0.14
Between 12 and 16 years of age		0.12		0.11		0.12
Between 17 and 19 years of age		0.09		0.10		0.08
Between 20 and 45 years of age		0.53		0.50		0.55
Country of origin						
US		0.05		0.06		0.04
Central and South America		0.15		0.15		0.14
Europe		0.30		0.41		0.23
Middle East		0.06		0.06		0.07
Asia		0.38		0.30		0.44
Africa		0.06		0.05		0.08
Pacific		0.01		0.01		0.01
Non official Mother tongue	0.05	0.68	0.04	0.60	0.05	0.74
Non official Language at home	0.01	0.42	0.01	0.34	0.01	0.46
Observations	914,386	920,940	204,170	198,090	242,596	260,790

TABLE 2. Sample Mean Number of Children for Women Aged 16-45 by Census Year

	1991	1996	2001	2006
Non-Immigrant	0.89	0.88	0.84	0.77
Immigrant	1.18	1.11	1.08	1.03
Years since migration				
0 to 5	0.88	0.84	0.88	0.85
6 to 10	1.11	1.06	1.00	1.00
11 to 15	1.22	1.18	1.08	1.02
16 to 20	1.26	1.25	1.23	1.08
More than 20	1.41	1.36	1.35	1.31
Age at immigration				
0 to 5 years old	0.77	0.77	0.72	0.68
6 to 11 years old	0.84	0.77	0.69	0.57
12 to 16 years old	0.91	0.78	0.71	0.62
17 to 19 years old	1.32	1.16	1.07	1.00
More than 19 years old	1.43	1.34	1.35	1.32
Country of origin				
US	1.11	1.17	1.18	1.10
Caribe	1.03	1.02	1.06	1.01
Mexico	1.65	1.73	1.55	1.41
Central America	1.38	1.33	1.24	1.17
South America	1.09	1.07	1.10	1.06
UK-Ireland	1.09	1.09	1.14	1.14
Northern and Central Europe	1.20	1.12	1.08	1.03
Eastern Europe	1.09	1.09	0.92	0.86
Southern Europe	1.57	1.48	1.35	1.19
Middle East	1.33	1.29	1.20	1.11
China	1.01	0.85	0.78	0.74
North-East Asia	1.07	0.91	0.84	0.76
South Eastern Asia	1.03	0.89	0.94	0.95
Southern Asia	1.13	1.25	1.26	1.23
North Africa	1.35	1.38	1.31	1.23
Central Africa	1.14	1.13	1.19	1.21
West Africa	1.01	1.24	1.14	1.13
Southern Africa	0.95	0.97	0.99	0.92
Eastern Africa	0.98	1.00	1.19	1.18
Pacific	1.03	1.09	1.09	1.02
Observations	402,260	444,460	485,210	503,386

Note: Differences in age structure of individuals across countries of origin in the sample are, in part, responsible for the differences in the mean number of children displayed in the table.

TABLE 3

A. Relative Immigrant Fertility by Language Background	
	Relative Fertility Rate
I. *Basic Model*	
Native born	--
Immigrant	1.104***
II. *Mother tongue*	
Native born (re: non official mother tongue)	--
OMT (Official Mother Tongue)	1.034***
Immigrant	1.143***
Immigrant x OMT	0.951***
Observations	1,833,526

B. Comparison of Relative Fertility		
	(Cumulative) RFR	z
Immigrant OMT = NB non OMT	1.125	29.39
Immigrant OMT = NB OMT	1.087	37.98
Immigrant OMT = Immigrant non OMT	0.984	-7.39

Panel A, shows the results of two Poisson regressions for the number of children living at home for a sample of women 16 to 45 years old. Both include controls for age, education, marital status, census year and location of residence.

In Panel B, the first column shows the relative fertility of each group relative to immigrants with an Official Mother Tongue. The second column reports the z of the significance of a test on the difference between these two groups based on the results from model II in Panel A.

(***) indicates significant at 1%, (**) indicates significance at 5 percent.

Table 4. Fertility Rate by Age at Immigration relative to Native Born [(1)] (P-values)

	(I)		(II)	
	Effect	P-value	Effect	P-value
Age at migration:				
Less than 1	1.01	*(0.46)*	1.03	*(0.00)*
1	1.01	*(0.36)*	1.03	*(0.00)*
2	1.02	*(0.01)*	1.04	*(0.00)*
3	1.02	*(0.00)*	1.05	*(0.00)*
4	1.03	*(0.00)*	1.05	*(0.00)*
5	1.02	*(0.00)*	1.04	*(0.00)*
6	1.04	*(0.00)*	1.06	*(0.00)*
7	1.07	*(0.00)*	1.08	*(0.00)*
8	1.07	*(0.00)*	1.08	*(0.00)*
9	1.07	*(0.00)*	1.08	*(0.00)*
10	1.07	*(0.00)*	1.08	*(0.00)*
11	1.07	*(0.00)*	1.08	*(0.00)*
12	1.09	*(0.00)*	1.09	*(0.00)*
13	1.11	*(0.00)*	1.11	*(0.00)*
14	1.12	*(0.00)*	1.12	*(0.00)*
15	1.13	*(0.00)*	1.12	*(0.00)*
16	1.18	*(0.00)*	1.17	*(0.00)*
17	1.20	*(0.00)*	1.19	*(0.00)*
18	1.22	*(0.00)*	1.21	*(0.00)*
19	1.24	*(0.00)*	1.23	*(0.00)*
20	1.21	*(0.00)*	1.20	*(0.00)*
21	1.21	*(0.00)*	1.20	*(0.00)*
22	1.19	*(0.00)*	1.18	*(0.00)*
23	1.16	*(0.00)*	1.16	*(0.00)*
24	1.12	*(0.00)*	1.12	*(0.00)*
25	1.11	*(0.00)*	1.11	*(0.00)*
26 and up	1.07	*(0.00)*	1.09	*(0.00)*
Place of birth	**--**		**YES**	

[(1)] The table shows the IRR from a Poisson regression of the number of children in the household. Both models include controls for age, education, marital status, census year, place of residence and place of birth This estimates are shown in figure 2.

Table 5. Fertility by grouped Age at Immigration and POB

	(I)		(II)	
	Effect	P-value	Cum. Effect	P-value
USA-Europe	0.96	*(0.00)*		
USA-Europe*(0-5)	1.14	*(0.00)*	1.02	*(0.00)*
USA-Europe*(6-11)	1.04	*(0.00)*	1.06	*(0.00)*
USA-Europe*(12-16)	1.04	*(0.00)*	1.10	*(0.00)*
USA-Europe*(17-19)	1.10	*(0.00)*	1.20	*(0.00)*
USA-Europe*(20-25)	1.08	*(0.00)*	1.11	*(0.00)*
Middle East	1.36	*(0.00)*		
Middle East *(0-5)	0.88	*(0.00)*	1.12	*(0.00)*
Middle East *(6-11)	0.82	*(0.00)*	1.17	*(0.00)*
Middle East *(12-16)	0.87	*(0.00)*	1.31	*(0.00)*
Middle East *(17-19)	1.06	*(0.00)*	1.64	*(0.00)*
Middle East *(20-25)	0.99	*(0.21)*	1.44	*(0.00)*
South Asia	1.15	*(0.00)*		
South Asia *(0-5)	0.82	*(0.00)*	0.88	*(0.00)*
South Asia *(6-11)	0.85	*(0.00)*	1.03	*(0.04)*
South Asia *(12-16)	0.92	*(0.00)*	1.16	*(0.00)*
South Asia *(17-19)	1.04	*(0.00)*	1.36	*(0.00)*
South Asia *(20-25)	0.98	*(0.02)*	1.22	*(0.00)*
Rest of Asia and the Pacific	0.89	*(0.00)*		
RoAsia/Pacific*(0-5)	0.90	*(0.00)*	0.75	*(0.00)*
RoAsia/Pacific *(6-11)	0.91	*(0.00)*	0.86	*(0.00)*
RoAsia/Pacific *(12-16)	0.96	*(0.01)*	0.95	*(0.00)*
RoAsia/Pacific *(17-19)	1.04	*(0.00)*	1.06	*(0.00)*
RoAsia/Pacific *(20-25)	1.08	*(0.00)*	1.04	*(0.00)*
Africa	1.32	*(0.00)*		
Africa *(0-5)	0.73	*(0.00)*	0.90	*(0.00)*
Africa *(6-11)	0.69	*(0.00)*	0.96	*(0.02)*
Africa *(12-16)	0.72	*(0.00)*	1.05	*(0.02)*
Africa *(17-19)	0.85	*(0.00)*	1.28	*(0.00)*
Africa *(20-25)	0.93	*(0.00)*	1.32	*(0.00)*
South America	1.23	*(0.00)*		
South America *(0-5)	0.94	*(0.00)*	1.15	*(0.00)*
South America *(6-11)	1.06	*(0.00)*	1.31	*(0.00)*
South America *(12-16)	1.10	*(0.00)*	1.36	*(0.00)*
South America *(17-19)	1.14	*(0.00)*	1.40	*(0.00)*
South America *(20-25)	1.08	*(0.00))*	1.33	*(0.00)*

[(1)] The table shows the IRR from a Poisson regression of the number of children in the household. Includes controls for age, education, marital status, census year and place of residence.
(I) Displays the IRR of the variables of interest: grouped place of birth and interaction of this and grouped age at immigration.
(II) Shows the cumulative effect of grouped place of birth and age at immigration together with the p-value of an F-test on the significance of the differences in fertility between immigrants from a given area and age at immigration and the native born. This column is shown in Figure 5.

Table 6. Fertility by Age at immigration and Place of Origin [(1)] (*P-values in italics)*

	POB indicator		Age 0-5		Age 6-11		Age 12-16		Age 17-19		Age 20-25	
	Effect	P-value	Effect	P-value	Effect	P-value	Effect	P-value	Effect	P-value	Effect	P-value
US	0.91		1.04	*0.00*	1.08	*0.00*	1.09	*0.00*	1.16	*0.00*	1.20	*0.00*
Caribe	1.23	*0.00*	0.88	*0.00*	1.02	*0.29*	1.07	*0.00*	0.98	*0.38*	0.91	*0.00*
Mexico	1.37	*0.00*	1.24	*0.00*	1.21	*0.00*	1.13	*0.00*	1.32	*0.00*	1.01	*0.70*
Central Am	1.57	*0.00*	0.74	*0.00*	0.79	*0.00*	0.85	*0.00*	0.92	*0.03*	0.84	*0.00*
South Am	1.06	*0.00*	0.94	*0.00*	0.98	*0.25*	0.99	*0.82*	1.01	*0.76*	0.92	*0.00*
N. and C. Europe	0.92	*0.00*	1.05	*0.00*	1.00	*0.82*	1.06	*0.02*	1.04	*0.13*	0.96	*0.01*
Eastern Europe	0.91	*0.00*	0.94	*0.01*	0.91	*0.00*	0.92	*0.00*	0.97	*0.17*	0.92	*0.00*
UK-Ireland	0.98	*0.00*	0.96	*0.11*	0.93	*0.00*	0.95	*0.02*	0.94	*0.00*	0.89	*0.00*
South Europe	1.10	*0.00*	0.96	*0.00*	0.98	*0.09*	1.00	*0.94*	1.04	*0.02*	0.94	*0.00*
Middle East	1.36	*0.00*	0.80	*0.00*	0.80	*0.00*	0.88	*0.46*	1.04	*0.03*	0.89	*0.00*
China	0.80	*0.00*	0.87	*0.00*	0.88	*0.00*	0.92	*0.03*	1.00	*0.94*	0.96	*0.00*
North East As	1.02	*0.00*	0.55	*0.00*	0.68	*0.00*	0.62	*0.00*	0.68	*0.00*	0.81	*0.00*
South East As	0.97	*0.00*	0.72	*0.00*	0.86	*0.00*	1.01	*0.60*	1.03	*0.10*	0.99	*0.29*
South Asia	1.15	*0.00*	0.74	*0.00*	0.83	*0.00*	0.92	*0.34*	1.02	*0.21*	0.88	*0.00*
North Africa	1.21	*0.00*	0.87	*0.00*	0.87	*0.00*	0.88	*0.00*	1.03	*0.36*	0.92	*0.00*
Central Africa	1.64	*0.00*	0.44	*0.00*	0.52	*0.00*	0.59	*0.00*	0.67	*0.00*	0.78	*0.00*
Western Africa	1.42	*0.00*	0.52	*0.00*	0.59	*0.00*	0.67	*0.14*	0.78	*0.00*	1.42	*0.00*
South Africa	1.10	*0.00*	0.76	*0.00*	0.73	*0.00*	0.75	*0.00*	0.80	*0.00*	0.83	*0.00*
Easter Africa	1.46	*0.00*	0.47	*0.00*	0.52	*0.00*	0.76	*0.00*	0.77	*0.00*	0.77	*0.00*
Pacific	0.91	*0.00*	1.02	*0.59*	1.07	*0.06*	1.14	*0.00*	1.24	*0.00*	1.03	*0.20*

[(1)] The table shows the IRR from a Poisson regression of the number of children in the household. Includes controls for age, education, marital status, census year, place of residence, place of birth and indicators for age at immigration groups and their interaction with each place of birth. By default the place of birth indicator corresponds to immigrants arriving older than 25. The omitted immigrant reference category is the group of older immigrants from the US.

The total effect of fertility for an area of origin and given age at immigration is calculated as the cumulated effect of being in a particular age group in the reference area of origin, the indicator for area of origin and the interaction between these two (See footnote 17)

Table 7. Fertility Rate by Age at Immigration and OMT relative to Native Born [(1)] (P-values)

	(I)				(II)	
	Immigrant		**Immigrant*OMT**		**Cumulative effect**	
	Effect	P-value	Effect	P-value	Effect	F- Test (P-value)
OMT indicator	1.035	*(0.00)*				
Age at migration:						
Less than 1	1.118	*(0.00)*	0.916	*(0.00)*	1.060	*(0.01)*
1	1.108	*(0.00)*	0.938	*(0.00)*	1.075	*(0.00)*
2	1.129	*(0.00)*	0.921	*(0.00)*	1.076	*(0.00)*
3	1.124	*(0.00)*	0.933	*(0.00)*	1.085	*(0.00)*
4	1.133	*(0.00)*	0.915	*(0.00)*	1.073	*(0.00)*
5	1.120	*(0.00)*	0.935	*(0.00)*	1.084	*(0.00)*
6	1.130	*(0.00)*	0.944	*(0.00)*	1.104	*(0.00)*
7	1.180	*(0.00)*	0.906	*(0.00)*	1.106	*(0.00)*
8	1.140	*(0.00)*	0.960	*(0.01)*	1.133	*(0.00)*
9	1.156	*(0.00)*	0.938	*(0.00)*	1.122	*(0.00)*
10	1.138	*(0.00)*	0.965	*(0.03)*	1.136	*(0.00)*
11	1.134	*(0.00)*	0.979	*(0.218)*	1.149	*(0.00)*
12	1.160	*(0.00)*	0.959	*(0.01)*	1.151	*(0.00)*
13	1.191	*(0.00)*	0.946	*(0.00)*	1.166	*(0.00)*
14	1.189	*(0.00)*	0.954	*(0.00)*	1.174	*(0.00)*
15	1.192	*(0.00)*	0.963	*(0.02)*	1.188	*(0.00)*
16	1.273	*(0.00)*	0.903	*(0.00)*	1.189	*(0.00)*
17	1.299	*(0.00)*	0.888	*(0.00)*	1.194	*(0.00)*
18	1.317	*(0.00)*	0.888	*(0.00)*	1.210	*(0.00)*
19	1.330	*(0.00)*	0.903	*(0.00)*	1.244	*(0.00)*
20	1.292	*(0.00)*	0.919	*(0.00)*	1.229	*(0.00)*
21	1.294	*(0.00)*	0.924	*(0.00)*	1.238	*(0.00)*
22	1.276	*(0.00)*	0.922	*(0.00)*	1.218	*(0.00)*
23	1.242	*(0.00)*	0.944	*(0.00)*	1.213	*(0.00)*
24	1.213	*(0.00)*	0.919	*(0.00)*	1.153	*(0.00)*
25	1.199	*(0.00)*	0.930	*(0.00)*	1.154	*(0.00)*
26 and up	1.183	*(0.00)*	*0.889*	*(0.00)*	1.089	*(0.00)*

[(1)] The table shows the IRR from a Poisson regression of the number of children in the household. Includes controls for age, education, marital status, census year, place of residence and place of birth.

(I) Displays the IRR of the variables of interest. Indicators for each age at immigration are shown in the first column ("Immigrant"), indicators for the interaction between age at immigration and OMT indicator are shown in the second column ("Immigrant*OMT")..

(II) Shows the cumulative effect of Official Mother Tongue and age at immigration on immigrant fertility together with the p-value of an F-test on the significance of the differences in fertility between immigrants and native born with OMT.

The column labeled "immigrant" can be interpreted as the effect of age at immigration on fertility for immigrants without an OMT. This column and column (II) are shown in Figure 3.

Table 8. Fertility by Age at Immigration and Education relative to Native Born [(1)] (P-values)

	(I)				(II)	
	Immigrant		Immigrant*University		Cumulative Effect	
	Effect	P-value	Effect	P-value	Effect	F-test (P-value)
University indicator	0.77	(0.00)				
Age at migration:						
Less than 1	1.05	*(0.00)*	0.91	*(0.00)*	0.736	*(0.02)*
1	1.05	*(0.00)*	0.93	*(0.00)*	0.747	*(0.16)*
2	1.05	*(0.00)*	0.97	*(0.07)*	0.779	*(0.32)*
3	1.06	*(0.00)*	0.93	*(0.00)*	0.757	*(0.49)*
4	1.07	*(0.00)*	0.91	*(0.00)*	0.744	*(0.09)*
5	1.07	*(0.00)*	0.90	*(0.00)*	0.737	*(0.02)*
6	1.08	*(0.00)*	0.91	*(0.00)*	0.751	*(0.25)*
7	1.11	*(0.00)*	0.90	*(0.00)*	0.765	*(0.93)*
8	1.11	*(0.00)*	0.86	*(0.00)*	0.733	*(0.02)*
9	1.11	*(0.00)*	0.86	*(0.00)*	0.733	*(0.02)*
10	1.09	*(0.00)*	0.90	*(0.00)*	0.758	*(0.60)*
11	1.10	*(0.00)*	0.89	*(0.00)*	0.750	*(0.26)*
12	1.12	*(0.00)*	0.88	*(0.00)*	0.753	*(0.39)*
13	1.14	*(0.00)*	0.87	*(0.00)*	0.762	*(0.78)*
14	1.15	*(0.00)*	0.84	*(0.00)*	0.740	*(0.07)*
15	1.15	*(0.00)*	0.83	*(0.00)*	0.737	*(0.05)*
16	1.21	*(0.00)*	0.80	*(0.00)*	0.742	*(0.11)*
17	1.22	*(0.00)*	0.84	*(0.00)*	0.782	*(0.27)*
18	1.23	*(0.00)*	0.85	*(0.00)*	0.801	*(0.01)*
19	1.24	*(0.00)*	0.91	*(0.00)*	0.862	*(0.00)*
20	1.20	*(0.00)*	0.98	*(0.14)*	0.901	*(0.00)*
21	1.20	*(0.00)*	1.02	*(0.17)*	0.930	*(0.00)*
22	1.17	*(0.00)*	1.03	*(0.01)*	0.927	*(0.00)*
23	1.15	*(0.00)*	1.03	*(0.01)*	0.907	*(0.00)*
24	1.12	*(0.00)*	0.99	*(0.21)*	0.848	*(0.00)*
25	1.12	*(0.00)*	0.96	*(0.00)*	0.827	*(0.00)*
26 and up	1.08	*(0.00)*	0.99	*(0.04)*	0.830	

[(1)] The table shows the IRR from a Poisson regression of the number of children in the household. Includes controls for age, education, marital status, census year, place of residence and place of birth.

(I) Displays the IRR of the variables of interest. The IRR for each age at immigration is shown in the first column ("Immigrant"), the IRR for the interaction between age at immigration and university indicator is shown in the second column ("Immigrant*University").

(II) Shows the cumulative effect of university education and age at immigration on immigrant fertility together with the p-value of an F-test on the significance of the differences in fertility between immigrants and native born with university education.

The column labeled "immigrant" can be interpreted as the effect of age at immigration on fertility for immigrants without university education. This column and column (II) are shown in Figure 4.

FIGURE 1

Distribution of Immigrants by Age at Immigration, Census 1991-2006

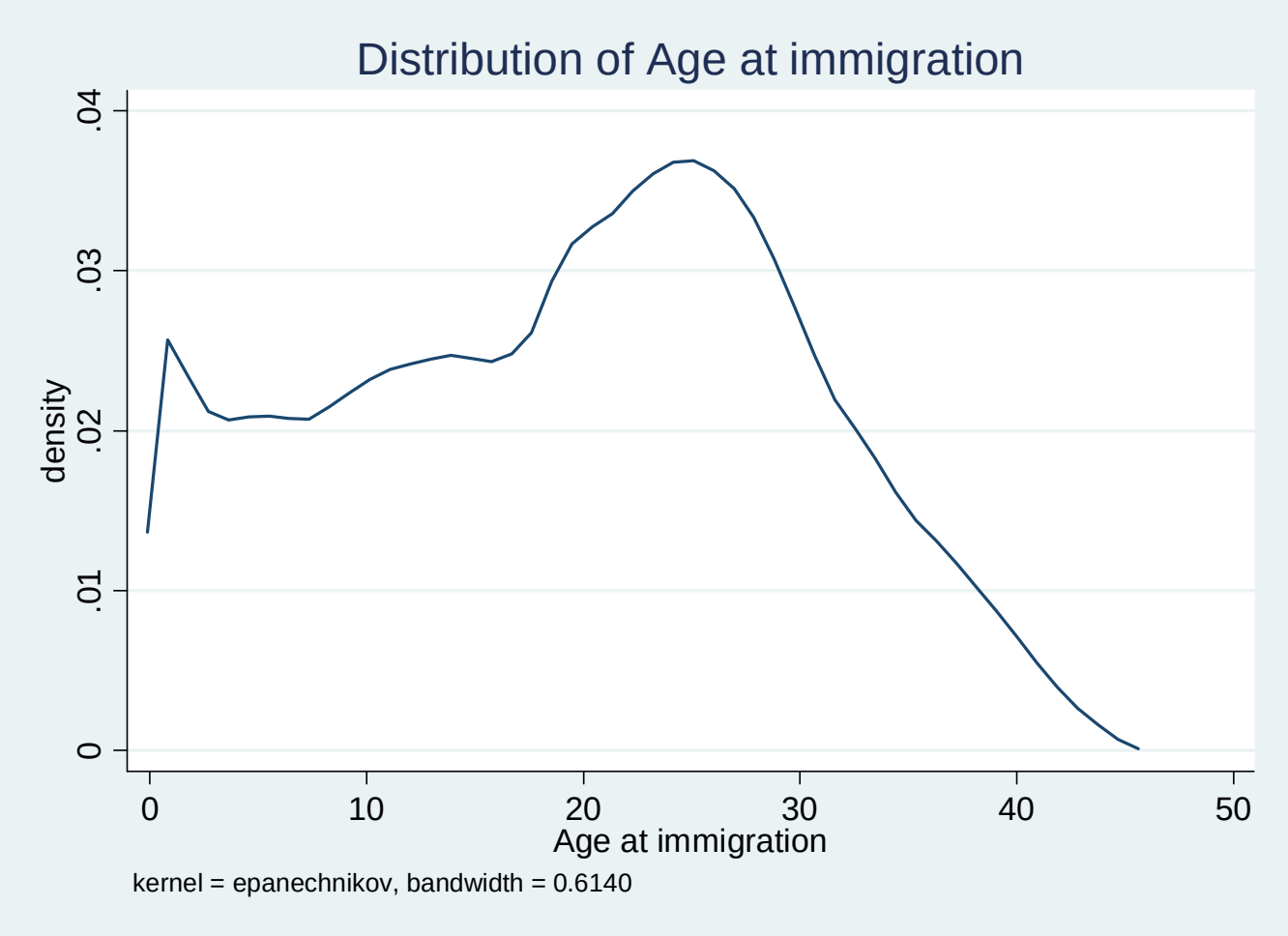
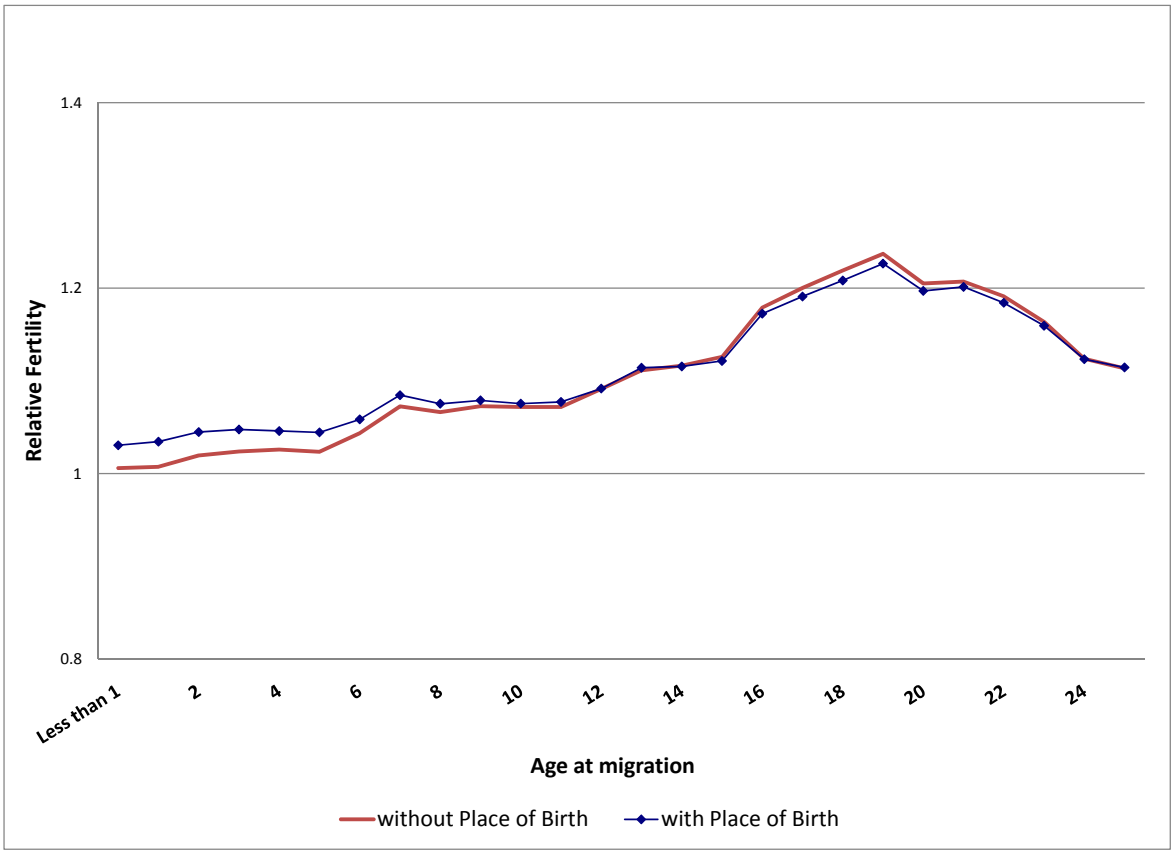
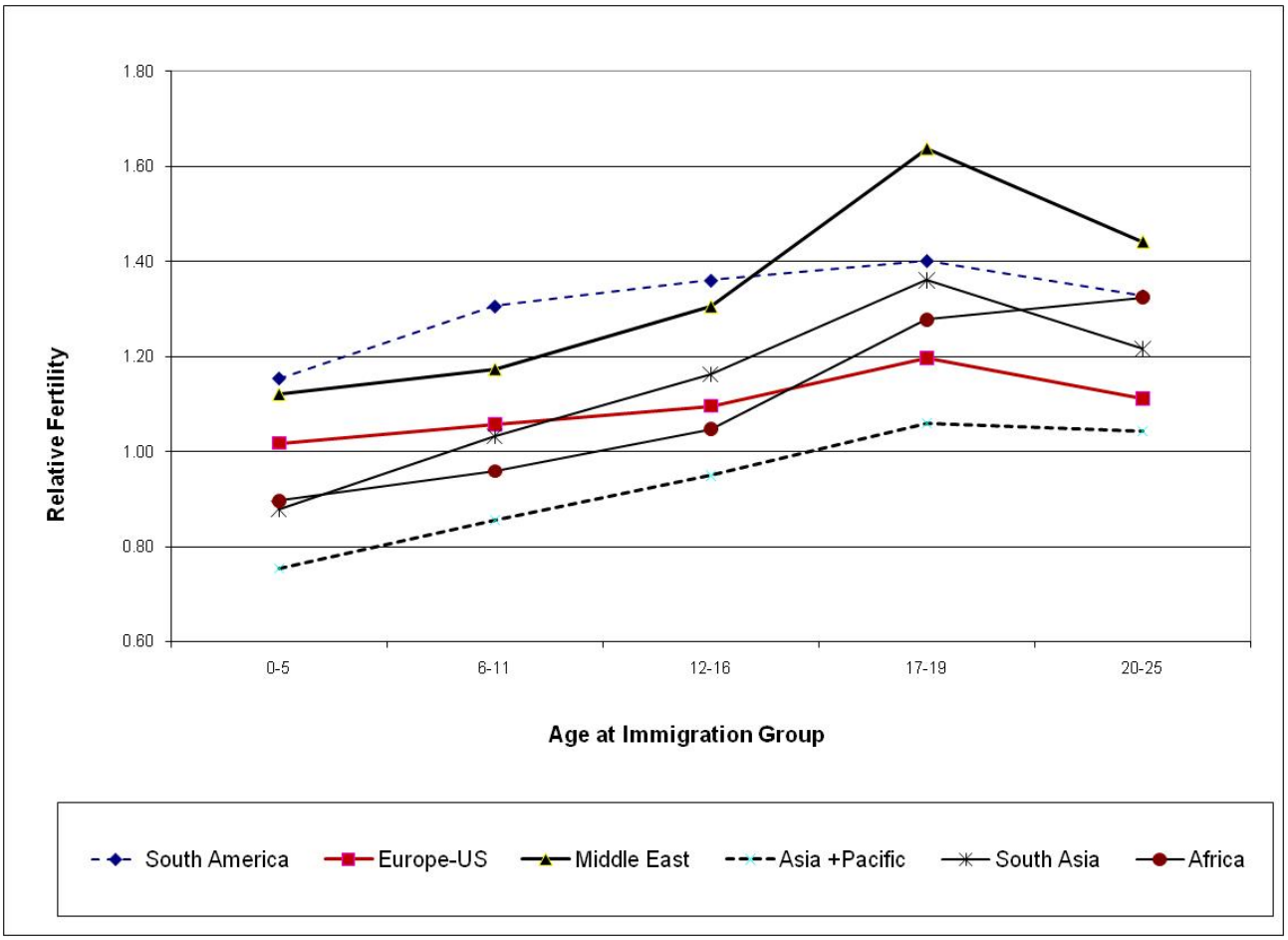


Figure 2: Fertility by Age at Migration relative to Native Born.



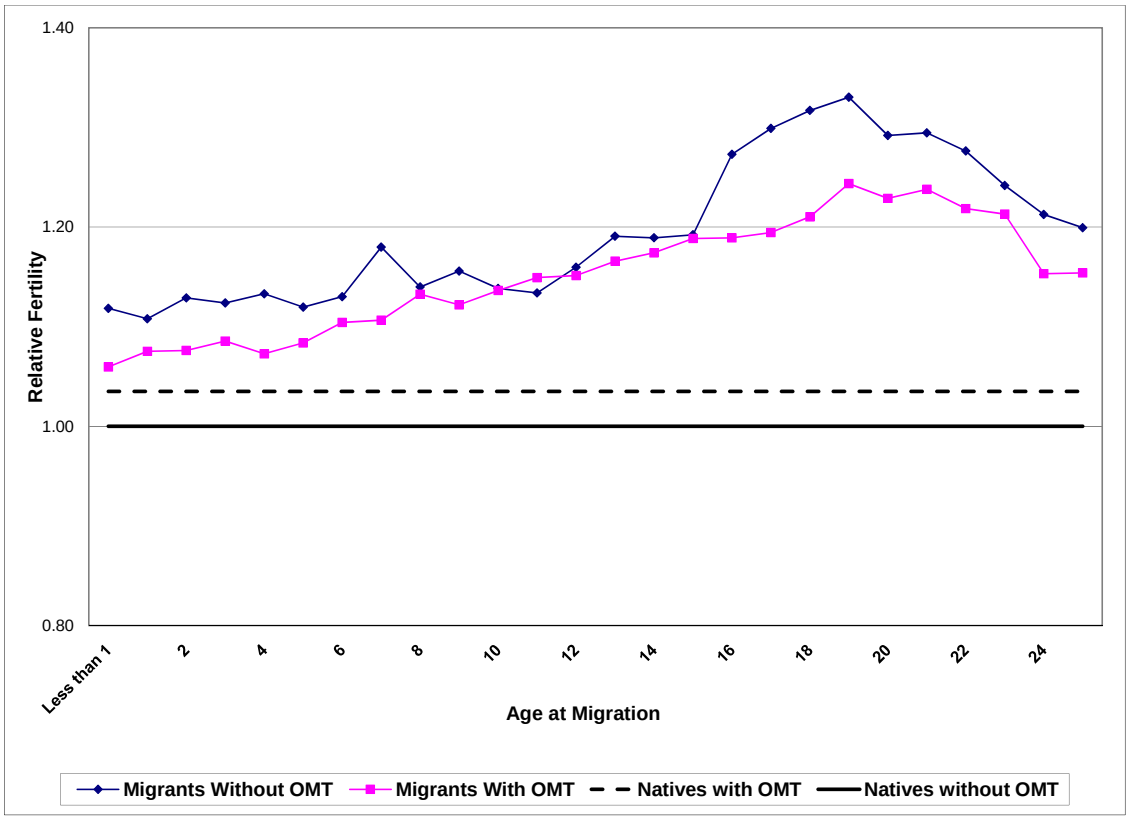
Note: Estimated fertility relative to Canadians from Poisson regressions in Table 4. Controls for age, education, marital status, location of residence and census year are included. In the model with place of birth, the US is the reference group shown in graph.

Figure 3: Fertility by Grouped Age at Migration and Place of Birth



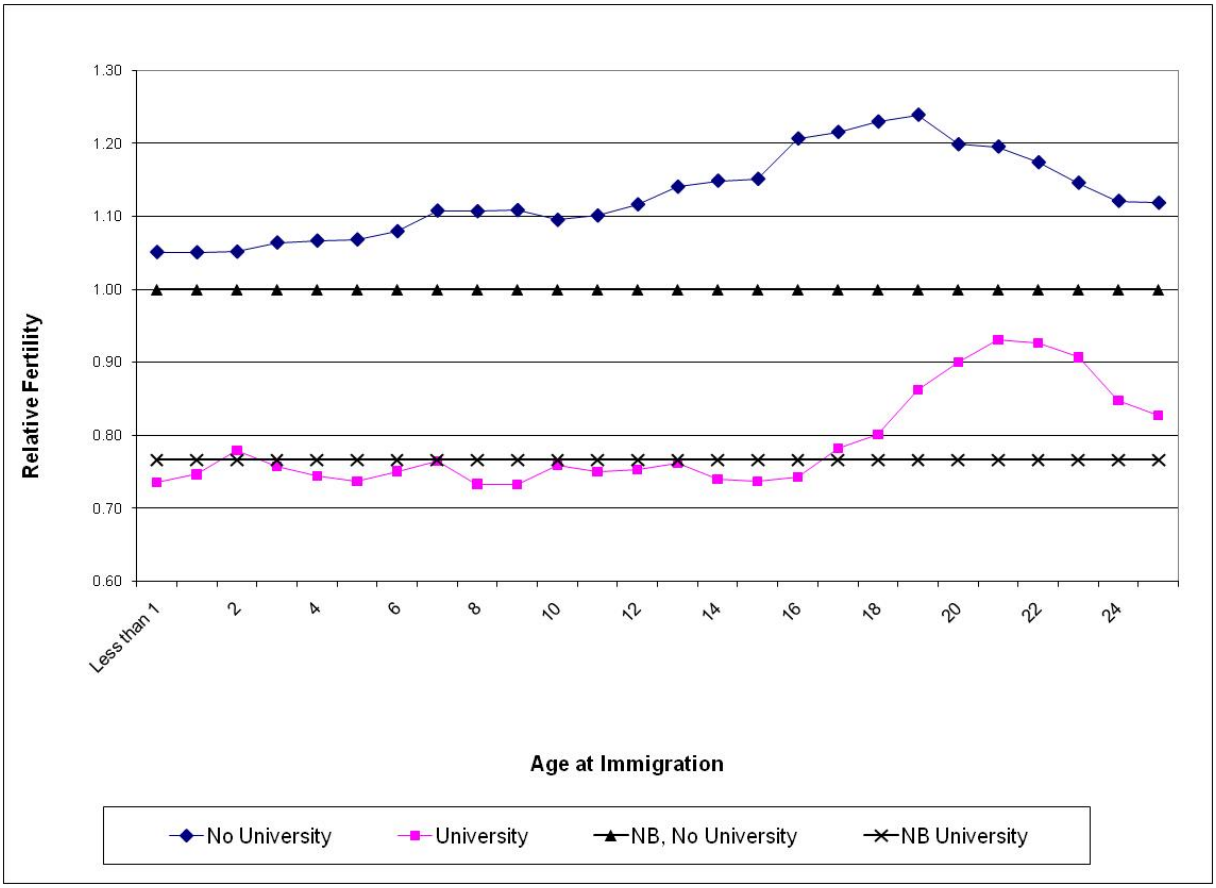
Note: Estimated fertility relative to Canadians from Poisson regression in Table 7. Controls for age, education, marital status, location of residence, census year and place of birth are included.

Figure 4: Fertility by Age at Migration and Official Mother Tongue (OMT)



Note: Estimated fertility relative to Canadians with no OMT from Poisson regression in Table 5. Controls for age, education, marital status, location of residence, census year and place of birth (re: USA) are included.

Figure 5: Fertility by Age at Migration and Educational Attainment



Note: Estimated fertility relative to Canadians with no university education from Poison regression in Table 6. Controls for age, education, marital status, location of residence, census year and place of birth are included.

Table A1. Fertility Rates by Area of Origin

	I. Basic model
	Relative fertility rate
Native born	--
Immigrant	
US	--
Caribe	1.15**
Mexico	1.37**
Central America	1.35**
South America	0.99
North and Central Europe	0.94**
Eastern Europe	0.88**
UK / Ireland	0.92**
Southern Europe	1.02**
Middle East	1.25**
China	0.76**
North Eastern Asia	0.92**
South East Asia	0.91**
Southern Asia	1.06**
North Africa	1.17**
Central Africa	1.33**
West Africa	1.27**
Southern Africa	0.97**
Eastern Africa	1.16**
Pacific	0.95**
Observations	1,835,326

The table shows the effect of place of birth on fertility from the basic model shown in table 4. The Poisson regression also includes controls for age, education, marital status, census year, place of residence and a full set of age at immigration indicators.

(***) indicates significant at 1%, (**) indicates significance at 5 percent.

TABLE 1B. Classification of Countries by Region of Origin

Caribe: Cuba, Dominican Republic, Haiti, Puerto Rico, Jamaica, Trinidad and Tobago, Guadeloupe, Martinique, Bahamas, Barbados, Netherlands Antilles, Saint Lucia, Saint Vincent and the Grenadines Virgin Islands, US Grenada , Antigua and Barbuda, Dominica, Cayman Islands, Aruba, Anguilla, Bermuda, Montserrat, Saint Kitts and Nevis Turks and Caicos Islands, British Virgin Islands

Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama

South America: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Falkland Islands (Malvinas), French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela.

Northern and Central Europe: Greenland, Denmark, Finland, Iceland, Norway, Sweden, Austria, Belgium, Germany, Liechtenstein, Luxembourg, Monaco, Netherlands, Switzerland, France..

Eastern Europe: Bulgaria, Czech Republic, Slovakia, Czechoslovakia, n.i.e., Hungary, Poland, Romania, Estonia, Latvia, Lithuania, Belarus, Moldova, Republic of Russian, Albania Federation, Ukraine, USSR., n.i.e., Bosnia and Herzegovina, Croatia, Slovenia, Yugoslavia

Southern Europe: Andorra, Gibraltar ,Greece, Italy, Malta, Portugal, San Marino, Spain, Vatican City State, Macedonia

UK Ireland: Ireland, Republic of (Eire) United Kingdom

Middle East: Afghanistan, Cyprus, Iran, Turkey, Armenia, Azerbaijan, Georgia, Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Bahrain, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen, Palestine/West Bank/Gaza Strip

China: People's Republic of China, Hong Kong, Macao, Mongolia

North Eastern Asia: Japan, Korea, North Korea, South Taiwan

South East Asia: Cambodia, Indonesia, Laos, Malaysia, Myanmar, Singapore, Thailand, Vietnam

Southern Asia: Philippines, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

North Africa: Algeria, Egypt, Libya, Morocco, Tunisia, Sudan, Western Sahara

Central Africa: Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, Gabon, Sao Tome and Principe, Zambia, Zaire

West Africa: Benin, Burkina Faso, Côte d'Ivoire, Cape Verde, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo

Southern Africa: Botswana, Lesotho, Namibia, Republic of South Africa, Swaziland

Eastern Africa: Eritrea, Uganda, Sudan, Kenya, Tanzania, Rwanda, Burundi, Somalia, Djibouti, Ethiopia, Comoros, Madagascar, Malawi, Mauritius, Mayotte, Mozambique, Reunion, Seychelles, Zimbawe

Pacific: American Samoa, Australia, Cook Islands, Fiji, Polynesia, New Caledonia, New Zealand