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The Fertility of Recent Immigrants to Canada

Alícia Adserà
Princeton University

Ana Ferrer
University of Calgary

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Alícia Adserà
adsera@princeton.edu

and

Ana Ferrer
aferrer@ucalgary.ca

Abstract

In this paper we examine the fertility experience of immigrants during their first years in Canada. Fertility decisions at the time of arrival may be crucial in determining immigrants' economic assimilation into the new country, as households with infants usually face large expenses and are constrained in the amount of time they can supply to the labour market. Using the confidential files of the Canadian Census of Population for the years 1991 through 2006 we look at native born-immigrant differentials in new births up to five years after migration. We find evidence of a relatively rapid growth in births during this initial period compared to both similar natives and migrants themselves during the two years before the move. To what extent the presence of infants in immigrant households converges to the levels of the native-born during the early migration years differs greatly by broad area of origin.

JEL classification codes: J11, J13, J15

Key words: Immigrant fertility; fertility disruption; recent immigrants

1. **Introduction**

The fertility of foreign-born women typically differs from that of the native born. Research in immigrant recipient countries such as the UK, Canada or the US has sought to document and understand these differences because of the increasingly prominent role that immigrant fertility plays in shaping demographic and economic trends in these countries (U.N. 2000; Beaujot, 2003; Sobotka, 2008). In this paper we focus on the fertility of immigrant women around the time of their migration to Canada. Assessing their initial fertility experience may be crucial to understand the determinants of their family's path to economic assimilation into the new country, as households with young children usually face large expenses and are constrained in the amount of time they can supply outside household production activities.

The literature has identified different mechanisms of fertility adjustment that account for the fertility experiences of adult immigrants (Goldstein and Goldstein 1981). *Selection mechanisms* highlight systematic differences between the fertility of individuals who eventually migrate and that of non-immigrant in the source country and this selectivity may explain the subsequent fertility patterns of migrants at destination (Kahn 1988, Sobotka 2008). *Convergence mechanisms* highlight the process of acculturation. Immigrants enter the host country with a set of fertility norms that are potentially different from those of the native born. Over time, they may alter their reproductive behavior to optimize socioeconomic success and to conform to the childbearing practices of their host country (Alba and Nee 1997; Gordon 1964; Carter 2000). Lastly, *disruption mechanisms* focus specifically on the disruptive effects of migration on fertility (Stephen and Bean, 1992; Kahn, 1994; Ng and Nault, 1997). Migration may separate spouses at least temporarily, or individuals who are planning to move may postpone childbearing until after they are settled in their new home. This anticipatory behavior may cause a temporary drop in fertility prior to the move or during the first years after migration (Toulemon 2004), and plausibly have long-term consequences on the fertility of immigrants

Economic theory builds on these ideas to incorporate the role that female wages, household income and childcare costs, among others, will play on shaping fertility decisions (Becker, 1981). Hence, there may be some economic disruption (as defined by Blau 1992) when the income of both wife and husband is temporarily depressed at the time of migration. A lower husband's income has a clear depressing effect on fertility, whereas lower women's wages have both an income and a substitution effect (lower opportunity cost of childbearing). Sufficiently large income effect will lead to a temporary slowdown in fertility until skills are upgraded or experience is acquired in the new labor market. Both mechanisms, the demographic and the economic, imply a slowdown of childbearing patterns around the time of migration (Stephen and. Bean 1992; Hervitz 1985)

Much of the initial evidence on immigrant fertility originated from the study of internal migration from rural to urban areas (Goldstein and Goldstein, 1981; White, Moreno and Guo, 1995; Jensen and Ahlburg, 2004). The international evidence developed with the increased importance of international migrant flows during the second half of the 20th century. In general, the empirical literature has found that the effects of immigration on fertility vary depending on both the source and host country. Among other papers, Blau's (1992) influential study of US immigrants finds some support for the three mechanisms. In support of the disruption mechanism, she finds that the fertility of immigrants tends to increase rapidly shortly after migration, relative to other immigrants with more seniority in the country and native-born individuals with similar demographic characteristics. Further she finds that immigrants from high fertility countries tend to have relatively low preference for fertility (supporting the selection mechanism). Finally, fertility increases over time for immigrants from a given cohort, offering some evidence of the convergence mechanism, although it does not seem to reach the levels of the native born. Ford (1990) offers further evidence of the short lived disruptions in fertility after migration to the US. Recent papers focusing on the fertility of Mexican migrants find ample evidence of disruption, but differ in their conclusions regarding convergence (Carter, 200; Heuveline, 2005; Choi, 2011). For Canada, Ng and Nault, (1997) report short lived fertility disruption upon immigration and quick convergence with domestic born fertility levels with socio-economic assimilation for the cohort of women for immigrants arriving during the late 1980s. In Europe, Mayer and Riphalm (2000) document evidence of assimilation of immigrants to Germany,, but not of short term disruptions in fertility behavior. For countries like France and the Netherlands or Sweden, there is evidence of short lived disruption followed by high levels of fertility right after migration particularly when women's migration is linked to marriage and family formation (Milewski 2010; Garssen and Nicolaas, 2008; Toulemon and Pailhe, 2008; Toulemon, 2004; Andersson, 2004). The fact that results concerning immigrants, including fertility behavior, are likely to differ not only by country of destination, but also by immigrant's source country confers particular interest to studies based on countries with a large and diverse immigrant population, such as the UK, Australia, US or Canada, and partly motivates this study.

We document how the fertility of recent immigrants to Canada compares to that of the native born and how it evolves during the first few years in Canada. In this regard, we divert from a substantial branch of the fertility literature that tries to distinguish between the selection and convergence explanations of immigrant fertility. We neither explore whether immigrants' completed fertility resembles that of the native born, to assess the convergence mechanism, nor do we compare immigrant fertility rates with those observed in their country of origin to assess the selection mechanism. Our interest in the short-term fertility behavior of immigrants when they enter Canada is motivated by its potential implications for the economic integration of the household as it affects the availability of immigrant women to work, among other things. Hence, our analytical approach resembles that of other papers that focus on the short term effect of migration on fertility (Toulemon, (2004; Ng and Nault, 1997; Ram and George, 1990).

Canadian immigration background

Canada has a long tradition as an immigrant receiving country. However, the nature and composition of immigration has changed significantly during the past 30 years. Immigration to Canada is controlled through a point system that assess applicants on the basis of individual characteristics such as education, age, language skills, arranged employment, personal suitability, and, until recently, occupation.[1] From the outset – and especially in recent years – the points system has focused on selecting skilled immigrants. Starting in the 1990s, Citizenship and Immigration Canada (CIC) specifically targeted the highly educated, on the premise that these immigrants will have the ability to adjust to changing labour market conditions and successfully integrate in Canadian society. This was to be achieved by maintaining a constant inflow of immigrants, around 200,000 new entrants per year, and increasing the weight given to education

[1] The point system was first introduced in 1960 to replace admission based on country of origin. Initially it was used to respond to short term labour demand needs (Green and Green, 1999). Immigrants admitted on compassionate grounds (refugees) or under family reunification are not affected by the point system. Immigrants admitted under the point system were 45% in 1990. The percentage rose quickly as a result of immigration policy and was around 60% for the majority of the years considered in this study (See *CIC Facts and Figures*, 2011)

in the point system.[2] As a result of these changes the education level of immigrants rose dramatically. In the 1980s, approximately 10% of all entering immigrants aged 15 and over had a university degree; by 2005 it was 45%. Fully 78% of principal applicants (those being selected on points) admitted over the 2000 to 2007 period had a university degree, as did about one half of their spouses. In addition, the composition of Canadian immigration changed in other dimensions. Before 1980, the majority of immigrants came from the United States or Europe (41 percent), while by 2006 only 19 percent of recent arrivals (that is, those arriving within the last five years) came from these places. In 2011 immigration from Asia constitutes 48 percent of recent arrivals versus 34 percent of all those who arrived before 1980, and twice as many recent newcomers are from Africa as there were before 1980 (*CIC Facts and Figures*, 2011).

What are the implications of these changes in immigration trends for the fertility of Canadian immigrants? The empirical evidence presented above suggests that fertility is greatly influenced by the mix of immigrants arriving in a destination country. Different cultures place different emphasis on different aspects of fertility (number of children, gender composition, timing, etc…). While women immigrating to Canada from developing economies in South America, South Asia and Africa typically have higher levels of fertility than the Canadian born, those from Northern Asian countries tend to have lower fertility (Adsera and Ferrer, 2010; Woldemicael and Beaujot, 2012). Hence, as immigration veered from Europe to other areas of higher fertility, immigrant fertility could be expected to increase depending on the extent and direction of immigrant selection. Canadian immigration policies, with emphasis on the highly skilled and educated immigrants, might well have selected women with preference for low fertility. However, immigrants from non-traditional source countries also face more language barriers and have more trouble validating their home-country education and general work experience in Canada (Ferrer and Riddell, 2005), which translates in lower wages and worse employment opportunities than those of previous immigrant cohorts.[3] The worsening of economic conditions upon arrival for recent immigrant cohorts could have two opposite effects on fertility. On the one hand it may induce female immigrants to postpone childbearing to

[2] Currently, new changes to immigration policies are reducing the role of the point system and increasing the number of immigrants entering under new programs such as the Provincial Nominee Program. This is unlikely to alter our results as it affected relatively small number of entrants before 2006.

[3] The empirical evidence indicates that the socioeconomic integration of new immigrants to Canada has declined considerably during the 1990s and 2000s (Abdeymir and Skaterud, 2005).

participate in the labour force and increase household income. One the other hand, it might reduce the opportunity cost of having children, by reducing outside options for women, and increase fertility. Overall, it is hard to predict the initial relative fertility of recent cohorts of immigrants.

In this paper we find that the fertility of immigrants upon arrival is generally lower than that of native-born women, but quickly rises over the following two years. There are also interesting variations by area of origin. Finally, we consider whether higher levels of education among recent immigrant cohorts affect observed fertility patterns in the discussion.

Next section discusses data and methodology. The third section presents our results on the fertility of Canadian immigrants during the first years after arrival. The last section concludes.

2. Data description

Canada lacks a fertility survey with complete fertility histories that we could use for our analysis. Instead we rely on the confidential files of the Canadian Census of Population (20% sample) for the years 1991, 1996, 2001, and 2006 to analyze fertility around the time of immigration. A disadvantage of the Census is that it contains only survey year information, but not information about individual characteristics at the time of the births or at the time of entry. However, because we focus on recent births during the period immediately surrounding migration we are relatively confident that we capture the characteristics of the household at the time of birth. .

On the other hand, the confidential files have the great advantage of providing large samples and more detailed information on individuals not available in public use data. Using this detailed information, we are able to link individuals in the same household and to compute the number of children of each woman living in the household. We exclude aboriginal individuals, since their analysis presents a very different set of challenges. We select adult married -or Common-Law (CL) - women between 18 and 45 years of age. Most adult immigrant women are married at the time of arrival (approximately 73%) as marriage is a requirement for spousal visa, which is the more common visa among female immigrants. Still only 16% of women between 18 and 45 immigrate with kids.

In order to reduce computing time to reasonable length, from each census we select all immigrant women 18 to 45 plus a 20 percent random sample of Canadian born women in the same age range and weight the observations accordingly. We also restrict the sample to those immigrants arriving in Canada as adults – at age 18 or older. Immigrants arriving as children may have, to some extent, conformed to Canadian fertility values and norms by the time they reach their fertile years (Mayer and Riphalm, 2000; Adsera and Ferrer, 2010 and 2013). Since our focus is on the fertility decisions surrounding immigrant arrival in Canada, it is natural to exclude the experiences of child immigrants, as they do not face at arrival the same trade-off between household and market time allocation that adult immigrants do. Note that Canadian women are also restricted to be adults, hence providing an adequate comparison group. Our final sample is close to one million observations.

For each of the selected women we have information about age, education, marital status, number of children living in the household, province of residence and immigrant status. In addition, for immigrant women we have information about year of immigration (becoming permanent resident), age at immigration and country of birth.

We measure fertility using the "own children" method which exploits the fact that the vast majority of young children live with their mothers. Rather than the actual number of children born to a woman, this measure computes the number of children living in the household. To the extent that some children may not live with their mothers, our dependent variable may be measured with some error.[4] The advantages of this method over the use of vital statistics to calculate differential fertility according to place of birth are discussed in Cho et Al. (1986). Further, for the Canadian case, Ng and Nault (1997) and Belanger and Gilbert (2003) show that estimated fertility differentials for immigrants and domestic born individuals using both methods are not very sizeable. In particular, Belanger and Gilbert (2003) show that estimated fertility

[4] The census questionnaire asks respondents to include children in joint custody who live most of the time in a household as household members. Therefore, our sample excludes all the children who are living mostly with their father. To the extent that young children are far more likely to live with their mothers, even after marriage disruption, this is not too important a concern.

differentials for immigrants and domestic born individuals for the period 1996-2001 using both methods are not very sizeable.[5]

The use of the own children method still presents some difficulties when studying fertility by years since migration. For instance, a measure of total fertility would include, to a varying degree, children born outside Canada at different points in time and it would be an inadequate measure of current fertility. Given our focus on short-term fertility changes we are less concerned with cumulative measures of fertility, such as completed fertility or total number of children in the household. An alternative is to confine the relevant ages of the children to produce more precise estimates of current fertility (Ng and Nault, 1997). This is important since fertility differentials between immigrants and native born women can change substantially during short time intervals, as each new entry cohort may have markedly different characteristics. Hence, in order to have an accurate measure of fertility decisions surrounding the time of immigration, we employ an indicator for the presence of an infant (under one year of age) in the household at the time the Census is conducted. We combine this indicator with information of years since migration to track accurately yearly fertility decisions around the time of the move.

Descriptive Statistics

Table A in the appendix presents sample summary statistics. Female immigrants are older, better educated and more likely to have children of pre-school age in their household than the Canadian born. The age difference between both groups diminishes and the education difference increases over the survey years. Data in the table clearly illustrates the shift in country of origin that took place in the 1990s, with less immigrants arriving from the US and Europe over time and a higher fraction arriving from Asia, Africa and the Middle East during recent years. The average age at immigration is roughly constant across census years, between 26 and 28 years of age. The average immigrant has stayed in Canada for around nine to ten years.

Table 1 reports the average number of infants (one year of age or less) by years since migration of the mother separately by Census year.[6] Canadian-born females are also shown for

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[5] We test the extent of the bias in our data by tabulating the number of children in the household and the number of children ever born, which is available in the 1991 census and find only a small bias similar to that reported by Belanger and Gilbert (2003).

comparison purposes. Table 1 contains raw figures; hence there are no controls for mother's age or other determinants of fertility. On average (last column in Table 1), the fraction of infants peaks once the mother has been for two years in the country (the prevalence of infants in the household is around eighty percent higher among those with two years of stay in Canada than among recently arrived immigrants) and diminishes slightly after that. Looking at individual census years (columns 1 through 4) provides a sense of the importance of fertility changes over time. The change in overall fertility trends is noticeable between 1991 and subsequent years. In 1991, the fraction of household with infants among very recent immigrant women not only rises after two-years since migration, but it keeps slowly increasing for women with a longer stay in Canada. In the 1996, 2001 and 2006 censuses, on the other hand, the number of infants peaks two years after migration, and diminishes after point. Further, the difference in recent fertility between women who have been for two years in Canada and those just arrived is much smaller for the 1991 census (18%) compared to subsequent years, when the presence of infants typically doubles. The average number of infants born to "settled" immigrant women (those who have been for more than five years in the country) is lower than the number born to Canadian women. This is likely the result of differences in ages and in the timing of births between the two groups, although the Census does not easily permit to explore the latter hypothesis in detail. Despite the yearly differences, cursory examination of the data suggests that there is some fertility disruption at the time of migration, at least in comparison to the rapid growth in births during the two years following migration. There is also evidence of changes in overall fertility between 1991 and the rest of the Census years. This is not surprising given the large changes in the composition of the recent immigrant population discussed above.

Table 1 also shows the growth in new births during the first years in Canada separately for each Census year in row 8. The change is particularly high for the years 1996 and 2006. These differences across Census years are suggestive of important cohort effects, as immigrants with already five years in Canada in 1991 may be very different from those just arriving to the country that year. It is well-known that using a single cross-section to infer the evolution of immigrant outcomes may be misleading (Borjas, 1985). We can however, track entry cohorts in

[6] The Census reports as the year of arrival the year at which the immigrant became a permanent resident. It is possible that the immigrant stayed previously in Canada as a temporary immigrant, which makes it difficult to ensure that a child born before the year of arrival has indeed been born outside Canada. However, transitions from

Table 1. For instance, immigrants entering the country during the 4 first months of 1991 will have been around five years in the country in 1996. The fertility outcomes for the 1991, 1996 and 2001 entry cohorts, and their evolution after five years in Canada, are boxed in Table 1. Following these cohorts suggests very different fertility behaviour among them during their first five years in Canada. The growth in new births for the 1991 cohort is 26% (versus 35% measuring across cohorts using only 1991 Census information), 41% for the 1996 cohort (versus 90% measuring across cohorts using only the 1996 Census), and 66% for the 2001 cohort (versus the 37% measured across cohorts using the 2001 Census).[7] Hence the prevalence of new births after a few years in Canada increased for subsequent entry cohorts, rather than moving up and down as a cross-section analysis would suggest. These within-across cohort differences highlight the importance of controlling for cohort effects in estimating immigrant outcomes. Also they may point to recent immigrant cohorts arriving with fewer children into Canada and experiencing later childbearing patterns.

Figure 1 plots the fraction of households with infants by age of either native-born or immigrant women who arrived within the last one to five years to Canada. The prevalence of infants among immigrants is high between 22 and 32 years of age, while for the native born it is high between ages 27 and 31. The vertical distance between the curves provides a sense of the magnitude of disruption. In Figure 1 immigrant fertility is substantially higher two or more years after migration for *all* age groups, than that of more recent immigrants (and the native born). A flatter and lower profile for recent entrants (during the first year) suggests that there is disruption, as fertility is depressed immediately after immigration.

Table 1(b) shows similar figures for the number of school-age children in the household. On average, the fraction of immigrant households with school age children is higher than that of Canadian born households at any given time since immigration except for households where immigrants arrived one year earlier or less. There have also been some changes over the census years regarding the speed at which pre-school child fertility has changed. For the cohorts we can track (the 1991, 1996 and 2001 entry cohorts), we note that the fraction of pre-school age

temporary to permanent residency were rare before 2001. They account for less than 20% of all permanent residencies granted in 2001 and 2006

[7] The growth in fertility within cohort is calculated by the difference in fertility between two boxes connected by an arrow (relative to the initial fertility)

children rose between 76% and 80% during the first five years in the country. Even if immigrant women arrive on average with less pre-school age children and have, potentially more resources to devote to the labour market, they quickly surpass the native born in this regard. By the time they have spent five years in Canada they have almost twice as many children of pre-school age than the average Canadian-born woman.

3. Immigrant fertility at the time of arrival

3.1 Infants and pre-school children

The above results capture the average behavior of recent immigrant households according to the length of stay in the country. However, to understand immigrant fertility around the time of migration it is important to control for the effect of other determinants of fertility which are likely to influence fertility decisions. To this effect we estimate the probability of having an infant at different times since migration using a non-linear probabilistic model (probit) of the following form:

$$P(F_i = 1 \mid x_i) = \phi\{\alpha X_i + \beta \sum_{n=0.5}^{5+} YSM_{in}\} \quad (1)$$

where ϕ is the normal distribution function, F_i is an indicator variable for the presence of infants in household *i*, $YSM_{i\,n}$ are a series of indicators for *n* years since migration (from less than one to more than five) for the female in household *i*. The vector X_i includes the remaining demographic controls for the woman such as mother's age, census survey year, geographical location (province indicators plus a rural area indicator) and cohort entry effects. As the evidence presented in Table 1 suggests, accounting for entry effects is important to isolate differences between immigrants arriving at different points in time. Entry effects will reflect the influence of factors such as changes in the economic conditions at the time of arrival or changes in the composition of the entry cohort not considered elsewhere in the regression (Chiswick, 1978). We not to include income controls in our analysis because of the difficulty of consider these as exogenous to fertility decisions. Hence, we claim no causal interpretation to the reported coefficients.

Since estimates from nonlinear models have no easy interpretation, Table 2 reports the predicted probabilities by time since migration resulting from estimating equation (1).[8] After controlling for age, census year, location of residence and cohort entry effects, the probability of having an infant in the household is 0.039 for recently arrived immigrants (compared to 0.078 for Canadian born households with similar demographic characteristics). This probability peaks two years after immigration when it reaches 0.075 and slowly declines after that. Note that we do not assess whether or not this in turn results in a long term disruption in completed fertility. In this paper we solely focus on the short term disruptive effects of migration on fertility.

Given the diverse and changing background of Canadian immigrants, it is interesting to assess how the fertility of immigrants arriving from different origins evolves at the time of entry. The disruption model posits that the length and magnitude of the fertility disruption will be influenced by differences in economic opportunities between the host and the source country. By comparing immigrants who arrive to Canada at the same time, we can assess the differential impact of source country on fertility disruption. In table 2, columns 2 through 7 restrict the sample to the native born and the immigrants from the area of origin indicated in the column label, indicating the probability of having an infant in immigrant households coming from different areas of the world. Areas of origin are classified into six categories: US-Europe, South America, the Middle East, South Asia, Rest of Asia and Africa. Most immigrants follow the pattern observed for the whole sample with a rising number of infants from arrival until peaking two or three years after migration. There are, however, significant differences across groups. Fertility for US-European immigrants continues to grow throughout the first five years in Canada, rather than "peaking" at two years after migration. South American and Middle East immigrants' fertility at arrival is similar and higher than that of the average immigrant. However, the fertility of South American immigrants does not rise as much, or as quickly as that of Middle Eastern immigrants in subsequent years. Asian immigrants display the lowest levels of fertility at all points during the first five years in Canada, with little variation after two years since migration. Within Asian immigrants, the fertility of immigrants from South Asia grows faster

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[8] Predicted probabilities are calculated using individual values of the covariates and averaging over the sample. They standardize the effect of a given amount of years since migration with the distribution of other covariates. The probabilities are comparable because only "years since migration" is changing across different probabilities. They are also representative of the sample because they use the individual's value of other covariates to evaluate the probabilities.

during the first two years since migration than among the rest. Finally, African immigrants show the highest levels of fertility, even during the initial years in the country. These results are in line with those in Adsera and Ferrer (2013). Woldemicael and Beaujot (2012) also report similar patterns for second generation immigrants of different ethnic background.

We report a measure of short-term disruption as the growth in the share of immigrant households with infants between recent arrivals and those who have been in Canada five years. This measure highlights the extent to which recent immigration affects fertility (compared to more settled households and after considering other factors such as mother's age, geographic location, survey year and cohort entry effects. By this measure Asian immigrants experience the highest disruption among all groups (over 200% difference in new births between new arrivals and settled population), followed by immigrants from the Middle East. Europeans and south Americans experience less disruption than the average married immigrant.

We also explore whether these differences in infant fertility by area of origin translate into differences in the number of children under five in immigrant and Canadian-born households. Even if less precise, this measure of fertility provides a sense of the spacing between children around the time of migration. To estimate differentials in the number of children under five, we use a Poisson model, as the dependent variable is a count variable.

$$F_i = \exp\{\gamma X_i + \beta^0 \sum_{n=0.5}^{5+} YSM_{in} + \beta^1 \sum_{n=0.5}^{5+} \sum_{j=1}^{6} (YSM_{in} * AO_j) + \varepsilon_i\} \quad (2)$$

where, as before, F_i is the measure of fertility (number of children under five years of age in the household *i)*, YSM_i is a series of indicator variables for each year since migration (*n*) for the female in household *i* (with *n* ranging from less than one year to more than five years since migration) and X_i is a vector of the remaining controls (mother's age, census year, geographical location and cohort entry effects). For ease of interpretation, rather than reporting the coefficients of the Poisson model, we report incident rate ratios (IRR). The IRR is the effect of a one unit change in the independent variable on the relative incidence rate of fertility of foreign born relative to the reference category (the Canadian born).

We show the estimated IRRs immigrants of a particular *AO* during the first five years of migration in Figure 4.[9] For reasons of space the actual estimates (and standard errors) are reported in table B in the appendix. Differences across these broad areas of origin are striking. Women from Other Asia (mostly China and North Asia) have significantly fewer children under the age of five than similar natives upon arrival (only 40% of the number for native-born). Even five years after migration, they only have 80% of the number of pre-school children than similar native-born households. The number of children 5 or under in households originating in US-Europe, Middle East and South Asian upon arrival is slightly over half of the number in native-born households. This difference decreases with years in Canada at different paces (relatively slowly for US-European women, and relatively fast for Middle Easter or South Asian women). Women from South America and Africa have the largest number of children five or under upon arrival among all immigrant groups, but still significantly below the benchmark of native-born households. By the fifth year after migration the number of children under five has grown significantly in all immigrant households. African and South Asian women show a substantially higher fraction of children five or under than similar native born women. Middle Eastern and South American women do not show substantial differences with the native born while women from US-Europe or Other Asia are substantially below native-born levels.

3.2. Timing to birth

The second part of our study focuses on the probability of a birth occurring within the period starting two years before and up until to four years after the year of migration. The sample includes immigrant women 18 to 45 who were at least 18 years old two years before arrival (the time of entering the risk pool). This exercise allows us to determine when, within this window, immigrant women tend to have their first Canadian child. This is of interest when analyzing the labour market potential of immigrant women at the time of migration. We expect that the closer to migration is a child born, the lower the probability that the mother was actively looking for employment at arrival. Having children later in this period suggests that more time was spent getting acquainted with Canadian institutions (including labour markets).

[9] A test of the goodness of fit test to assess the null hypothesis that the data are Poisson distributed fails to reject the null.

Timing analysis relies on the use of duration models which estimate the risk of a certain event happening over time. The hazard function (λ) is defined as the event rate at time t conditional on survival until time t or later (that is, $T \geq t$). We characterize λ using the Cox proportional hazard models of the timing of births. For woman i who enters a state of risk of a certain event at time t = 0, the (instantaneous) hazard ratio of exit (e.g., a birth at time t>0 is assumed to take the following form:

$$\lambda_{it} = \lambda_0(t)\, exp(X'_{it}\,\beta) \qquad (3)$$

where $\lambda_0(t)$ is the baseline hazard function; $exp(.)$ is the exponential function; X_{it} is a vector of covariates summarizing woman's characteristics at time t; and β is a vector of parameters to be estimated. Since the Census does not record the month of immigration, the dependent variable is measured in years. Hence immigrant women enter the risk pool of having a birth two years before migration and we follow them until four years after migration.[10] Our basic model includes the total number of previous children, the age and gender of the last child, as well as indicators for the census year as covariates. We report the corresponding survival functions starting two years before migration. The estimated hazard ratios for all models are reported in Table B in the appendix. Standard errors are obtained using a grouped robust variance estimator as described in Lin and Wei (1989).

Table 3, column (I) shows the survival to having a birth for married immigrant women around the time of migration. Three years after migration approximately half of the immigrant women had had a child during the period considered. Results indicate that fertility accelerates somewhat around the time of immigration, as implied by the steeper slope of the survival function at this point. Interestingly, the slope of the survival function, which indicates the speed at which a birth arrives within the period considered increases (in absolute value) around the year of migration. The absolute value of the slope almost doubles between the year before migration and the year of migration. Speed remains high for the next year as well and slowly comes down to pre migration levels three years after migration.

We checked the robustness of this result by adding other controls to the model: education, a full set of cohort effects, and place of birth. Accounting for these factors does not change the observed pattern. However, adding age at immigration as a control to the basic model somewhat accelerates the survival rates, suggesting that age at arrival is an important determinant of the timing of immigrant fertility (see column II in Table 3). For this reason, we estimate the fertility survival stratified by age at immigration; that is allowing a different baseline hazard functions for each group (women arriving at either ages 20 to 24; 25 to 29; 30 to 34; or 35 to 45). Results are plotted in Figure 2. The estimated coefficients and changes in the slope of the survival function are reported in table C in the appendix. Not surprisingly, there are substantial differences in survival rates for immigrants arriving at different ages. Women 20 to 24 at arrival are less likely to have had any birth during the two years before migration than other migrants (though their rate is similar to immigrants arriving 35 to 45). However, the likelihood of a birth for 20 to 24 years old increases sharply just after migration, with the slope of the survival function doubling the year of migration. The following age group of 25 to 29 years old experiences a similar take off of births at arrival. By contrast, the survival functions of immigrants arriving after 30 years of age are much flatter.

What do these results tell us about the timing of birth relative to Canadian-born woman? Unfortunately we cannot measure the fertility probability of Canadian-born women on the same timing scale because we cannot construct for them a time frame around migration. We have estimated the survival function to a first birth for married Canadian-born women from age 18 over their fertile years until age 45 (see Table D in the appendix). The survival probability to a first birth of currently married Canadian-born women at age 24 is 65%. The comparison of this trajectory with the survival to a birth of any parity among migrants in the period surrounding migration, shown in Figure 2, is not ideal since immigrant women could already have previous children before entering the sample two years before the move. However, we wanted to provide a reference of the timing of childbirth among Canadian born married women to frame the immigrant results, particularly when focusing on those immigrants arriving fairly young and who are more likely childless. For instance, 59% of immigrants arriving between 20 and 24 years of age did have a child in the period surrounding migration we study. This share is higher than the estimated 35% of Canadian-born women who have their first child between the ages of 18 and 24. For immigrants arriving between 25 to 29 years old, the probability of a birth during

[10] We have also considered models with an additional year before migration (up to 3 years) but results do not change substantially.

the period comprising two years before and four years after migration (when the youngest in this group would move from age 23 to 29 years old) is 63%. By contrast, an estimated 41% of Canadian born women would have their first child between the ages of 23 to 29. Again, despite its large limitations, this comparison would suggest that immigrant women arriving young, are more likely to have a child around migration than Canadian-born women of a similar age are to have their first child.

Finally, to assess the influence of cultural background on the timing of fertility we have stratified the hazard rates by broad area of origin (US-Europe, Middle East, South Asia, Rest of Asia and Africa).[11] The results shown in Figure 3 indicate that immigrants from the rest of Asia have the highest survival rates of all immigrant groups and African immigrants the lowest. This is in contrast with results by Andersson (2004) in his study of Swedish immigrant fertility patterns. Although his results are more detailed, our findings for the relative timing of fertility among immigrants from Africa, South Asia and the Middles East are similar to his.

Regarding changes in the speed of births around migration time (table E in the appendix), Asian immigrants show the greatest change in the rate of survival, particularly during the first year of migration. The survival probability of South Asians at migration drops 7 percentage points during the year previous to migration and 17 percentage points in the year of migration. For women from Other Asia the same corresponding numbers are 5 and 10 percentage points.[12]

4. Discussion

We find that the probability that an immigrant woman has an infant upon arrival is almost half than that of a Canadian-born woman with similar characteristics. After five years in Canada, the prevalence of infants in immigrant households increases, coming already close to that of Canadian-born around two years after women migrate, but remaining slightly below that of the Canadian born. To a great extent, these initial differences in fertility seem to be driven by - broadly defined - cultural differences. European, American and Asian immigrants show the lowest levels of fertility, relative to the native born, during the first years after migration. In fact,

[11] For 2001 and 1991, we also have information about religion. Using these two years, we have re-estimated the hazard function, stratifying by religion (Christian, Muslim, Hindu/Sikh, No religion and Other Religion). Results indicate that the largest change in the slope of the survival function around migration occurs for the Hindu/Sikh denomination. This is consistent with our results based on broad areas of origin.

these groups do not reach parity with native-born women during the first five years after arrival. African and Middle Eastern immigrants, on the other hand, show the highest levels of fertility among all migrant groups, relative to the native born, earlier in the migration process. It is not clear why migration would be more disruptive for those coming from Asia, particularly China. A key consideration here could be to what extent different groups have different preferences towards a two-earner family model.[13] The timing results are consistent with the results on current fertility just reviewed. On average, immigrant women have a child within the first year of migration, rather than a few years after. This finding could be partly driven by the life cycle stage at which migrant women are when moving to Canada. Survival fertility around migration is the lowest for women who are young (in their 20s) when they migrate. To the extent that changes in the speed to a first Canadian birth may reflect the disruptive effects of migration, and indicate delay fertility until after arrival, women immigrating in their late 20s seem to experience the largest effects. We also observe that area of origin effects affect the level of the survival probability. African and South Asian women are the groups with a higher speed to a first Canadian birth at the time of migration.

Given Canada's focus on education and skills, it is important to explore to what extent these estimates change when we take into account the educational attainment of the mother. As reported in the introduction, changes in immigration policy over the period of study increased the numbers of educated immigrants arriving in Canada.[14] Educated immigrant women might experience higher opportunity costs of children than less educated ones, particularly during the initial years in Canada, and defer fertility for longer than less educated immigrants in order to offset the costs of immigration. Conceivably they may also foresee larger returns to any initial local human capital investment they undertake during their first years in Canada. If this were the case we would expect to see even higher immigrant-native differentials for educated women

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[12] We have estimated the models with and without controlling for age at immigration, which is a potentially an endogenous variable, and we have not found any significant differences in the speed of fertility.

[13] Although we do not have information to address this question, we report the fraction of women by area of origin who are principal applicants as an indicator of women's career orientation (2010): 63% of principal applicants from Asia are women, versus 35% from Africa and 50% from South America or from Europe.

[14] The stress on education and skills usually applies to the principal applicant (typically the husband in a couple). However, the education level of the spouses has also risen during these years. The fraction of female immigrants with post-secondary education went from 35% to 54% over the sample period while the corresponding proportion among native-born women only rose from 31% to 42% (Sweetman and Warman, 2010).

during the first years after arrival. On the other hand, if those women move to Canada with similarly educated spouses, they may be less financially constrained at arrival if they decide to have children. The interplay between education and fertility is a complicated one, affected by the same sort of problems that plague the interaction between fertility and labour market activity. We do not have information on maternal education at the time the child was born, but rather at the time of the survey. We use it to estimate the prevalence of infant separately for those with or without post-secondary education by introducing in equation (1) a set of interactions of the college indicator with the years since migration indicators. For this exercise, we use a sample of immigrants arriving at 25 years of age or older.[15] We find no evidence of fertility differentials between immigrants and similarly educated native-born women (results are available upon request.). However, when we estimate the fraction of pre-school children in immigrant households by years since migration we note a difference in fertility patterns (Table F in the appendix). At arrival, non-college educated immigrant women have 73% fewer young children than native-born women. By the third year since migration these women have "caught up" to the fertility of the native born and by five years since migration, they have 23% more young children than similarly educated natives. By contrast, college educated women have 55% fewer young children than similarly educated native-born women when they move to Canada and they only reach parity with them five years since migration. Note however, that in the long run - that is, for settled immigrants with more than five years of residence – both educated and uneducated immigrants have approximately 20% higher fertility than their native-born reference groups. Hence, the initial reduction in fertility is larger for educated women and the catching up takes longer. Although purely descriptive, the result does suggest that college educated immigrants have a higher opportunity cost for children upon arrival or are more forward looking about the potential of early human capital investment in Canada and seem to delay Canadian fertility to a greater extent than less-educated immigrants.

We also wonder to what extent immigrants arrive with already formed families and how this affects our fertility estimates. In general, it is not clear what effect immigrating with children might have on fertility after migration. It could be the case that females immigrating with children are closer to their desired family size and therefore will limit their fertility after

[15] This ensures that the education decision is independent (to the extent possible) to the decision to have a child around migration time and that education is likely completed by the time of immigration (Ferrer and Riddell 2006)

migrating. However, immigrating with children also reduces the market options of migrant women and reduces, to some extent, the cost of additional children, plausibly leading to a fertility increase. To assess the importance of this issue, we have analyzed the fertility decisions of immigrant women who were childless before arriving (60% of the sample) and found similar results in all dimensions, although starting at lower levels of fertility.[16] In this regard, it is reassuring to know that heterogeneity in the number of children women bring along when they migrate is not driving the results. These results are available upon request.

Although our data does not allow us to fully assess life cycle considerations, we have checked how our results are affected if we considered that age has a different effect on fertility for immigrants and the native-born. To this effect we have performed two types of robustness checks. We have re-estimated all models including an interaction between age and immigrant status and we have repeated the estimation restricting the women to be in defined age groups. The results are qualitatively similar. For women in the 25 to 29 and 30 to 34 year range, initially the fraction of immigrants with an infant within a year of immigrating is half of that of Canadian-born women in the same age group, and it peaks in the third or fourth year after migration, although it never quite reaches parity with the native born. Older immigrant women show only slight differences with the native born (results available upon request).

This paper highlights the importance of a deeper understanding of immigrant fertility. The ability to forecast population growth, demand for public services or even labour supply, increasingly requires considering immigrant fertility. Our analysis suggests that this is a relatively complex process that should take into account the changing composition of the immigrant population. While immigrants to Canada seem to have fewer births during the time surrounding migration, these quickly rise to the level of the native born, and geographic area of origin remains a strong influence in explaining differences in fertility levels after immigration. Somewhat surprisingly, we find relatively very little differences between educated and non-educated women in the way their fertility rates change with years since migration, other than in levels.

[16] The Census does not allow accounting for children left behind in the country of origin. To the extent that different immigrant groups leave children behind at different rates, this could affect our results.

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Table 1(a). Unadjusted Average fraction of infants in the household (1)

by Years since Migration

	Census Year				
	1991	1996	2001	2006	Average
Native born	0.083	0.076	0.070	0.078	0.077
Years since migration					
Less than 1 year	0.095	0.063	0.065	0.055	0.069
1 year	0.089	0.082	0.081	0.088	0.085
2 years	0.112	0.131	0.126	0.130	0.125
3 years	0.115	0.122	0.114	0.124	0.119
4 years	0.127	0.120	0.098	0.109	0.112
5 years	0.128	0.120	0.089	0.108	0.109
5-year growth	35%	90%	37%	96%	58%
More than 5 years	0.048	0.057	0.057	0.054	0.054

(1) Women 18 to 45 years of age, married or living common law. Immigrants include only those who were 18 or older at the time of arrival. Infants are children under 1 year of age

Table 1(b). Unadjusted Average fraction of pre-school children in the household (1)

by Years since Migration

	Census Year				
	1991	1996	2001	2006	Average
Native born	0.395	0.398	0.360	0.376	0.383
Years since migration					
Less than 1 year	0.366	0.303	0.324	0.271	0.315
1 year	0.351	0.332	0.331	0.323	0.334
2 years	0.407	0.393	0.404	0.399	0.400
3 years	0.467	0.469	0.446	0.465	0.462
4 years	0.558	0.541	0.458	0.500	0.511
5 years	0.663	0.595	0.513	0.548	0.566
More than 5 years	0.048	0.057	0.057	0.054	0.054

(1) Women 18 to 45 years of age, married or living common law. Immigrants include only those who were 18 or older at the time of arrival. Pre-school children are those younger than 5 years of age.

Table 2. Predicted Probability of having an infant [(1) (2) (3)]
By Years since Migration

	All	US Europe	South America	Middle East	Other Asia	South Asia	Africa
NB	0.078	0.076	0.076	0.076	0.076	0.078	0.076
Immigrants							
Time in Canada							
Less than 1 year	0.039	0.037	0.048	0.046	0.016	0.018	0.078
1 year	0.047	0.033	0.049	0.059	0.025	0.034	0.094
2 years	0.075	0.053	0.066	0.088	0.050	0.063	0.126
3 years	0.073	0.056	0.065	0.091	0.050	0.052	0.117
4 years	0.072	0.056	0.061	0.087	0.051	0.053	0.114
5 years	0.073	0.058	0.064	0.085	0.054	0.056	0.105
Disruption *	87%	57%	33%	85%	238%	211%	35%
More than 5 years	0.062	0.049	0.054	0.078	0.050	0.035	0.106
Observations	914,590	615,215	543,085	585,230	552,695	566,010	519,895

Each column shows the predicted probability of having an infant in the household for different model specifications.

(1) The first column uses the whole sample of 18 to 45 year old married or living common law women. Immigrants include only those who were 18 or older at the time of arrival. Infants are children under 1 year of age. The rest of the columns include the sample of native-born women plus immigrants of the same characteristics but from the specified area of origin.

(2) All models control for age, geographical location (column (1) only), census year and entrance cohort effects.

(3) All estimates are significant at 1%

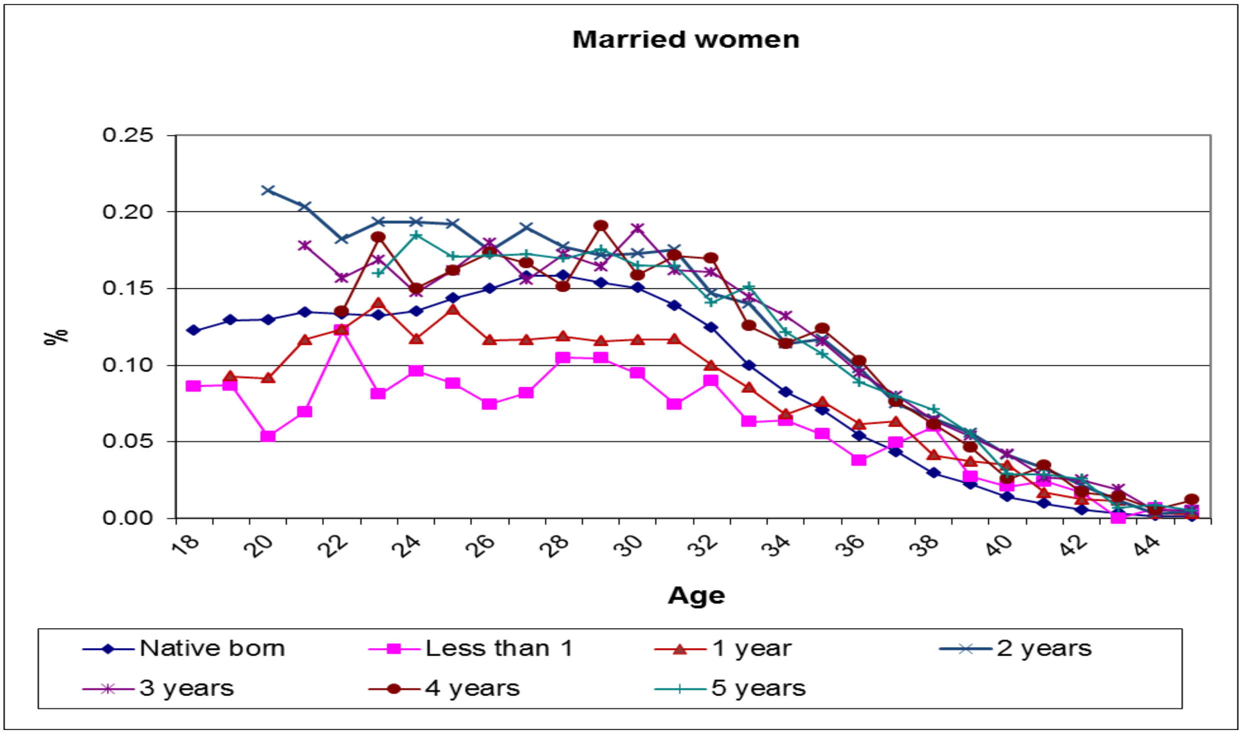
(*) The disruption measure reflects the growth in the number of infants in the household between recent immigrants and those that have stayed in Canada5 years

Table 3. Married immigrants survival to first birth around migration

	(I) Basic controls		(II) Plus age at immigration	
	Survival	Year change	Survival	Year change
2 yrs before	0.94		0.93	
1 yr before	0.87	-0.06	0.86	-0.07
Migration	0.76	-0.11	0.74	-0.12
1 yr after	0.67	-0.10	0.64	-0.10
2 yrs after	0.59	-0.08	0.55	-0.08
3 yrs after	0.52	-0.06	0.49	-0.07
4 yrs after	0.47	-0.05	0.43	-0.06

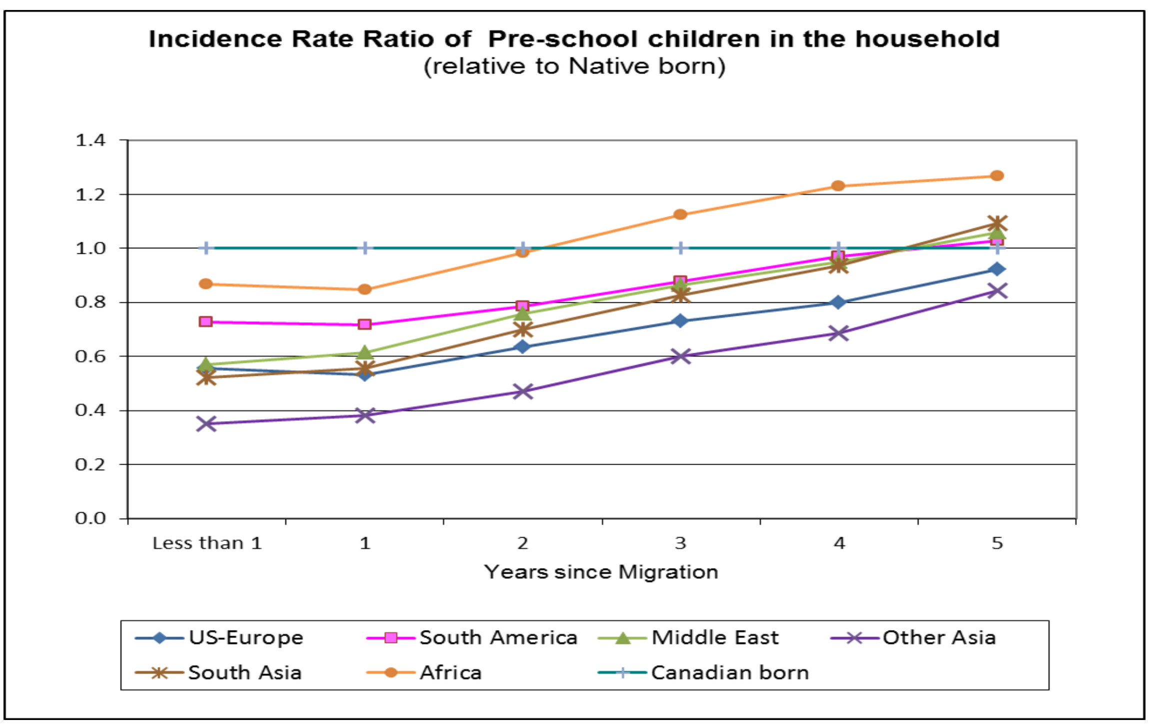
Both models include basic controls for age, number of previous children, age and gender of the last child, survey year and rural area.
Column (II) includes as well age at immigration indicators. See Table G in the appendix, columns (I) and (II) for the estimated hazard ratios

Figure 1. Prevalence of infants by age of the mother and years since arrival to Canada



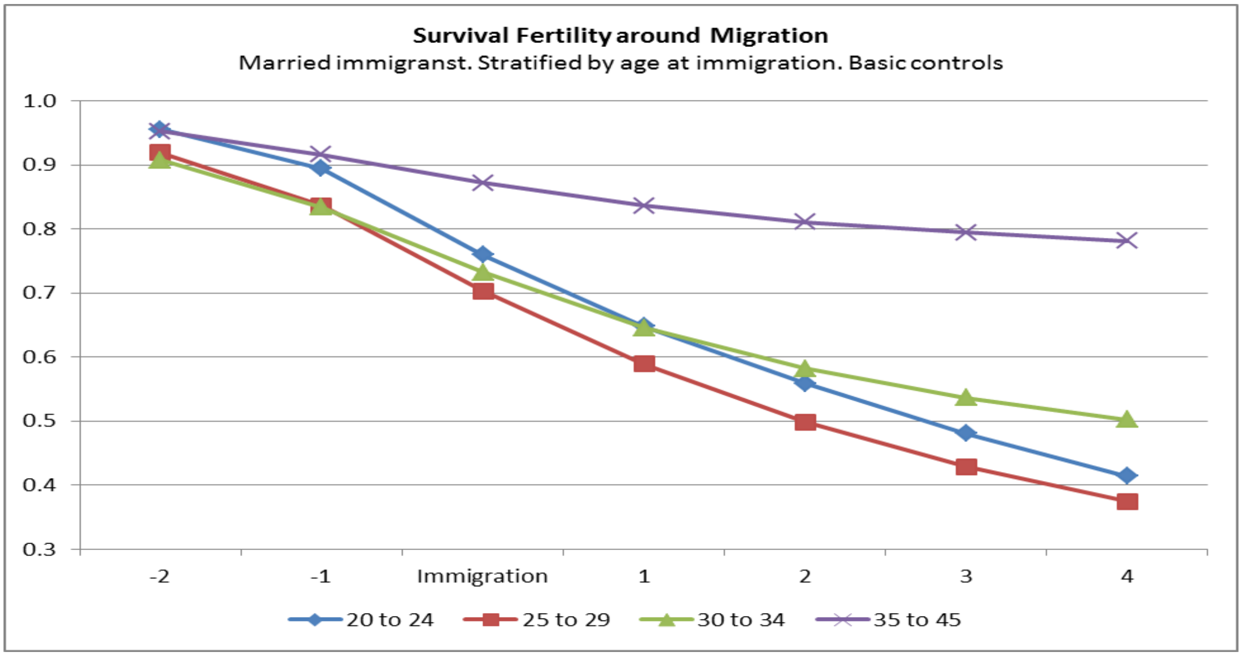
Source: Author's calculations using the Candaian Census of Population 1991, 1996, 2001, 2006. Data in Figure are the averages over all these Census years.

Figure 2



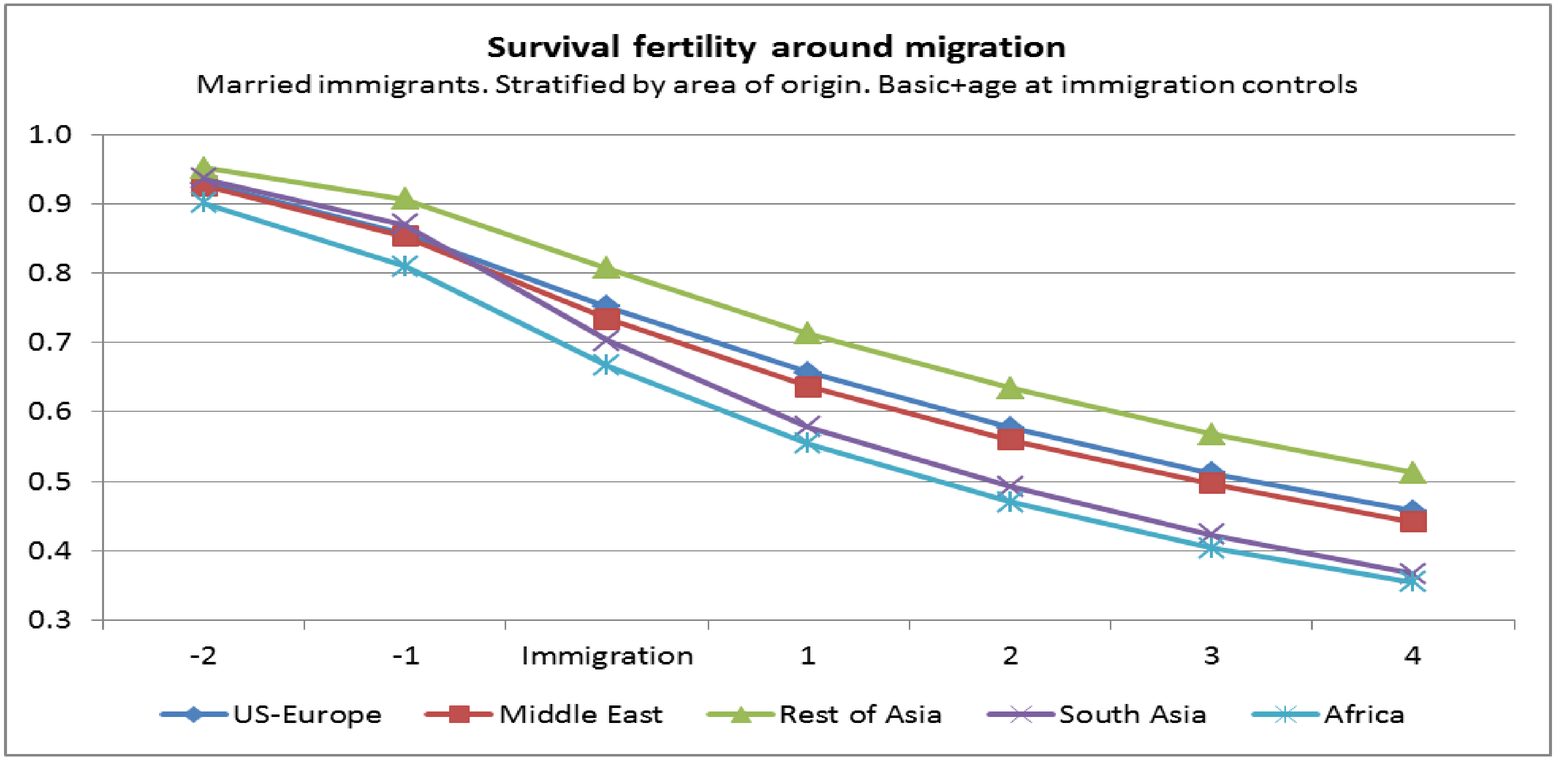
Source: IRR from a poisson model on the number of pre-school children in the household. Models include controls for age, location, survey year, and cohort entry effects.
Estimated IRRs (and corresponding p-values) reported in Table B in the appendix.

Figure 3



Source: Survival rates caculated from the hazard model reported in Table G in the (column labelled "Figure 3"). Basic controls are age, number of children, age and gender of previous child, survey year and rural area. Table C in the appendix reports the estimated survival fertility rates and the change in slope between periods.

Figure 4.



Source: Survival rates caculated from the hazard model reported in Table G in the appendix (column labelled "Figure 4"). Model includes basic controls (age, number of children, age of previous child, gender of previous child, survey year and rural area) plus indicators for age at immigration. Table E in the appendix reports the estimated survival fertility rates and the change in slope between periods.

Appendix

TABLE A. Sample Summary Statistics

	All				1991				2006			
	Canadian Born		Immigrant		Canadian Born		Immigrant		Canadian Born		Immigrant	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age	34.57	6.78	36.21	6.01	33.58	6.62	36.24	6.13	35.10	6.85	36.04	5.90
College	0.44	0.50	0.49	0.50	0.34	0.47	0.37	0.48	0.53	0.50	0.62	0.49
Young Children	0.29	0.45	0.31	0.46	0.30	0.46	0.29	0.45	0.29	0.45	0.32	0.47
Infants	0.08	0.26	0.07	0.27	0.08	0.27	0.07	0.25	0.08	0.27	0.07	0.26
Years since Migration												
Less t. 1 year			0.03	0.18			0.04	0.19			0.03	0.17
1 year			0.08	0.27			0.08	0.27			0.08	0.27
2 year			0.07	0.26			0.07	0.26			0.07	0.26
3 year			0.07	0.26			0.06	0.25			0.07	0.26
4 year			0.07	0.26			0.06	0.23			0.07	0.26
5 year			0.06	0.24			0.04	0.20			0.08	0.27
More than 5			0.61	0.49			0.65	0.48			0.60	0.49
Area of origin												
USA-Europe			0.31	0.46			0.40	0.49			0.22	0.46
South and Central America			0.12	0.32			0.13	0.34			0.10	0.31
Middle East			0.22	0.41			0.15	0.36			0.24	0.42
Other Asia			0.14	0.35			0.11	0.32			0.15	0.36
South Asia			0.17	0.38			0.15	0.35			0.21	0.41
Africa			0.06	0.24			0.05	0.22			0.07	0.26
Age at immigration			27.26	6.07			26.06	5.90			27.88	5.94
Observations	493,508		421,081		119,155		88,175		122,183		124,537	

Sample of 18 to 45 years old married women. Immigrants arrive after 18 years of age.

Table B. IRR for the number of Pre-school age children in Immigrant Households relative to Native-born households

	All	US-Europe	South America	Middle East	Other Asia	South Asia	Africa	No Post-Secondary	Post-Secondary
Native born	(ref)			(ref)				(ref)	1.127*
									(0.000)
Less than 1	0.580	0.557	0.728	0.571	0.352	0.521	0.868	0.727	0.545
	(0.000)	(0.000)	(0.000)	(0.591)	(0.000)	(0.203)	(0.000)	(0.000)	(0.000)
1	0.590	0.533	0.716	0.616	0.381	0.556	0.848	0.732	0.572
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.167)	(0.000)	(0.000)	(0.000)
2	0.713	0.636	0.785	0.758	0.471	0.699	0.985	0.848	0.686
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
3	0.830	0.732	0.877	0.865	0.600	0.825	1.125	0.971	0.803
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.497)	(0.000)
4	0.926	0.800	0.970	0.948	0.686	0.936	1.229	1.092	0.890
	(0.054)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.043)	(0.000)
5	1.048	0.924	1.030	1.059	0.845	1.094	1.269	1.230	1.021
	(0.243)	(0.061)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
More than 5	0.973	0.851	0.938	1.011	0.888	0.900	1.190	1.201	1.201
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

First column shows the estimated IRR for the number of pre-school age children (0 to 5 years of age) in immigrant households with a given length of stay in Canada, relative to Native-born households. The Poisson regression is estimated over the full sample of married-CL women age 18 to 45 and immigrants arriving 18 or older and. Includes controls for age, province and rural area, year of survey and cohort entry effects.

Columns 2 through 7 show the IRR for the number of pre-school age children (0 to 5 years of age) in immigrant households with a given length of stay in Canada and from a given area of origin, relative to Native-born households The Poisson regression includes the above controls plus the interaction of time since migration indicators and area of origin indicators. Represented in Figure 2.

Columns 8 and 9 show the IRR for the number of pre-school age children (0 to 5 years of age) in immigrant households with a given length of stay in Canada relative to similarly educated native born women. The Poisson regression is estimated on a sample of 25 to 45 year old women. Immigrants in the sample arrived to Canada at 25 years of age or older. Controls include those indicated for the first column plus the interaction of time since migration indicators and education at the time of the survey

(*) IRR for post-secondary educated Canadian born women relative to non-educated Canadian born women

Table C. Survival Fertility of Married Immigrants (Stratified by age at immigration)

	20 to 24		25 to 29		30 to 34		35 to 45	
	Survival	Year change	Survival	Year change	Survival	Year change	Survival	Year change
2 yrs before	0.96		0.92		0.91		0.95	
1 yr before	0.89	-0.06	0.84	-0.08	0.83	-0.07	0.92	-0.04
Migration	0.76	-0.13	0.70	-0.13	0.73	-0.10	0.87	-0.04
1 yr after	0.65	-0.11	0.59	-0.11	0.65	-0.09	0.84	-0.04
2 yrs after	0.56	-0.09	0.50	-0.09	0.58	-0.06	0.81	-0.03
3 yrs after	0.48	-0.08	0.43	-0.07	0.54	-0.05	0.79	-0.02
4 yrs after	0.41	-0.07	0.37	-0.05	0.50	-0.03	0.78	-0.01

Model includes basic controls (age, number of children, age of previous child, gender of previous child, survey year and rural area).
See Table G in this appendix for the estimated hazard ratios

Table D. Survival fertility to First Birth of Married Canadian women.

At age	Probability	At age	Probability
18	0.979	27	0.422
19	0.946	28	0.360
20	0.904	29	0.307
21	0.852	30	0.262
22	0.791	31	0.227
23	0.721	32	0.200
24	0.646	33	0.180
25	0.568	34	0.164
26	0.492	35	0.152

Model of survival fertility of married Canadian-born women over their fertile years (18 to 45). The estimated hazard function includes controls survey year and geographical location.

Table E. Survival Fertility of Married Immigrants
(Stratified by area of origin)

	US-Europe		**Middle East**		**Rest of Asia**		**South Asia**		**Africa**	
	Survival	Year Change	Survival	Year Change	Survival	Year Change	Survival	Year Change	Survival	Year Change
2 yrs before	0.93		0.93		0.95		0.94		0.90	
1 yr before	0.86	-0.07	0.85	-0.07	0.91	-0.05	0.87	-0.07	0.81	-0.09
Migration	0.75	-0.10	0.73	-0.12	0.81	-0.10	0.70	-0.17	0.67	-0.14
1 yr after	0.66	-0.09	0.64	-0.10	0.71	-0.09	0.58	-0.12	0.55	-0.11
2 yrs after	0.58	-0.08	0.56	-0.08	0.63	-0.08	0.49	-0.09	0.47	-0.08
3 yrs after	0.51	-0.07	0.50	-0.06	0.57	-0.07	0.42	-0.07	0.40	-0.07
4 yrs after	0.46	-0.05	0.44	-0.05	0.51	-0.06	0.37	-0.06	0.35	-0.05

Models include basic controls (age, number of children, age of previous child, gender of previous child, survey year and rural area) + Age at immigration.
See Table G in this appendix for the estimated hazard ratios

Table F. IRR for the number of Pre-school age children in the household relative to Native-born households		
	(I) Non-College	(II) College or more
Canadian born	(ref)	1.127*
Immigrants – YSM		(0.000)
Less than one year	0.727	0.545
1 year since migration	(0.000)	(0.000)
2 years since migration	0.732	0.572
3 years since migration	(0.000)	(0.000)
4 years since migration	0.848	0.686
5 years since migration	(0.000)	(0.000)
	0.971	0.803
More than 5 years	(0.497)	(0.000)

Columns show the IRR for the number of pre-school age children (0 to 5 years of age) in immigrant households with a given length of stay in Canada relative to similarly educated native born women. The Poisson regression is estimated on a sample of 25 to 45 year old women. Immigrants in the sample arrived to Canada at 25 years of age or older. Controls include age, province and rural area, year of survey and cohort entry effects plus the interaction of time since migration indicators and education at the time of the survey

(*) IRR for post-secondary educated Canadian born women relative to non-educated Canadian born women

Table G. Time to first birth between two years before and four years after migration.

	Table 3. Column I in the paper (Common Hazard)		Table 3. Column II in the paper (Common Hazard)		Figure 3 in the paper (Stratified by Age at Immigration)		Figure 4 in the paper (Stratified by Area of Birth)	
	Hazard	P-value	Hazard	P-value	Hazard	P-value	Hazard	P-value
N. Children	0.660	0.000	0.769	0.000	0.767	0.000	0.752	0.000
Age prev. child	1.008	0.000	1.006	0.000	1.008	0.000	1.007	0.000
Prev. child-girl	1.150	0.000	1.197	0.000	1.184	0.000	1.209	0.000
Age (omitted 40-45)								
20 to 24	0.907	0.000	0.821	0.000	0.890	0.000	0.784	0.000
25 to 29	1.091	0.000	0.941	0.000	0.942	0.000	0.915	0.000
30 to 34	1.232	0.000	1.035	0.000	1.010	0.116	1.023	0.000
35 to 39	1.201	0.000	1.074	0.000	1.058	0.000	1.070	0.000
CensusYear (omitted 2006)								
Year 1991	1.117	0.000	1.082	0.000	1.077	0.000	1.101	0.000
Year 1996	1.041	0.000	1.041	0.000	1.040	0.000	1.061	0.000
Year 2001	0.990	0.126	0.994	0.336	0.994	0.366	1.005	0.392
Rural	1.142	0.000	1.127	0.000	1.130	0.000	1.150	0.000
Age at Immigration(omitted 20 to 24)								
25 to 29			1.153	0.000			1.175	0.000
30 to 34			0.904	0.000			0.936	0.000
35 to 45			0.371	0.000			0.388	0.000

Hazard ratios (and robust P-values) on the risk of birth around migration time, corresponding to figures 2, 3 and 4.
Sample includes immigrant women arriving after 20 years of age.