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Son Preference and the Persistence of Culture: Evidence from Asian Immigrants to Canada
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ABSTRACT

Sex ratios at birth are above the biologically normal level in a number of Asian countries, notably India and China. Standard explanations include poverty and a cultural emphasis on male offspring. We study Asian immigrants to Canada using Census data, focussing on sex ratios across generations and religious groups. We find sex ratios to be normal at first parity, but rising with parity if there were no previous son. Since these immigrants are neither poor nor live in a society tolerant of sex discrimination/sex selection, our findings are more consistent with a preference for sons *per se* (and not for sons as a means to, e.g., old age support). Additionally, we uncover strong differences by religious affiliation that align with historical differences in doctrine concerning infanticide. Comparing across generations of Asian immigrants, we find fertility responds strongly to the sex composition of older children for first generation families. For the second generation, expression of son preference through the fertility channel is muted whereas sex selection seems to persist.

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1 Introduction

The biologically normal sex ratio is about 105 boys per 100 girls at birth. Excess male mortality during childhood causes the sex ratio to steadily decline and reach gender balance around age twenty. As is well known by now, sex ratios have been substantially higher for a number of Asian countries — notably India and China [Miller, 1981, Das Gupta, 1987, Banister, 1987, Zeng et al., 1993, Tuljapurkar et al., 1995, Scharping, 2003, Ebenstein, forthcoming, Chung, 2007]. In China, more than 120 boys were born per 100 girls in 2005 [Li, 2007], a sex ratio which implies a surplus of one million males in that single birth year alone. Sex ratios at birth have risen steadily since the early 1980s, resulting in an estimated 25 million more males than females under age 20 in 2005.¹ Initially, Chinese officials claimed the sex ratios were driven by some unknown racial specificity of Chinese people, a position that has since given way to recognition of son biased preferences and practises [Scharping, 2003, p.288]. For India, the 2001 census showed 108 boys per 100 girls in the 0-6 age group, up from 105.8 in the 1991 census. While all Indian states showed more boys than girls in this age group (which is indeed normal), Punjab topped the chart with a sex ratio of 125 boys per 100 girls, up from 114 in 1991.

These developments have prompted investigation into the underlying causes. Most of the focus has been on why parents would want sons rather than daughters. One strand of research emphasizes socio-economic and institutional factors. Absent ability to save or national pensions, the poor rely heavily on children for old age support. Agriculture and manual labor puts a premium on physical strength which together with patriarchal norms have meant that sons are particularly prized, e.g. Chung and Das Gupta [2007]. In addition, in India, high and rising dowry payments are argued to place families with daughters at a disadvantage (although it is the rich

¹Zhu et al. [2009] states a 32 million male surplus, but that seems to be from assuming that the 2005 inter-census sample is 1% instead of 1.3%, pointed out by Avi Ebenstein, personal communication.

rather than the poor states that discriminate the most against girls, the high sex ratios in Punjab being a case in point.) It has even been argued that families depend on males for physical protection [Oldenburg, 1992]. Finally, for China, the one-child policy is widely believed to have contributed to elevated sex ratios, e.g., Hesketh et al. [2005], Ebenstein [forthcoming] for some recent contributions. These explanations are context specific and, key for our analysis, absent in Canada.

Another strand of explanations stresses the cultural value attached to a male offspring. According to Hindi tradition, only a son can light a man's funeral pyre. Similar beliefs characterize Chinese traditions, where lineage is traced solely through the male, and failure to produce a son is considered tantamount to "extinction" of the family line and an affront to core Confucian values. Traditional sayings such as "Raising a daughter is like watering a plant in another man's garden" or "A daughter is a thief" illustrate this sentiment, as does the current Chinese Law on Population and Birth PRC [2002, Article 22] which states: "[It is] forbidden to discriminate against or mistreat women who give birth to female infants and women who do not give birth [i.e., are infertile]. It is forbidden to discriminate against, mistreat, or abandon female infants."

Understanding the role of culture in determining son preference is critical for predicting future developments in Asia. Das Gupta et al. [2009] set out evidence of contrasting time series trends. Sex selection technology has improved, become more available, and become cheaper through time. This has increased sex ratios. However, higher levels of education, industrialization, and other markers of development may lead to more natural sex ratios, they hypothesized. For this reason, Das Gupta et al. [2009] see an "incipient turnaround" in Asian sex ratios. Such a turnaround, however, depends critically on the depth of the cultural preference for sons.²

The source of son preference notwithstanding, a male offspring can be

²Another reason to expect balanced sex ratios despite son preference is that as a country grows richer, parents may actually want all their children to marry, see Edlund [1999] and Edlund and Lee [2008].

achieved through one of two channels. First, a family can continue to produce children until a male child arrives. Second, the sex can be selected using post-conception mortality manipulation, such as abortion or infanticide. The costs of having additional children vary with the direct expenditures on children as well as the cost to the mother (and father) of time spent out of the labor force for child-rearing. The cost of mortality manipulation depends on any direct costs for implementing the manipulation, but also on cultural or religious attitudes towards infanticide and abortion.³

In this paper we study sex ratios among Asian immigrants to Canada using the 2001 and 2006 censuses. Asian immigrants to Canada offer an interesting case for several reasons. Many of the socio-economic and institutional factors advanced to explain high sex ratios in India and China are not present in Canada. Canada is a rich OECD country with extensive welfare provisions, meaning that poverty and the need to rely on sons for old age support is less likely to be a factor. Furthermore, most family heads are admitted based on a point system or through ‘investor’ or ‘entrepreneur’ provisions, ensuring that immigrants are positively selected. Given the large income differences between Canada and India, a daughter’s dowry would not be onerous (should it be required). Moreover, the role of land, to pass on or to farm, is likely to be limited since recent immigrants have been decidedly urban, vocationally and locationally. The economic opportunities of sons and daughters are similar. International comparisons of crime rates are difficult due to variation in definitions, but homicide rates are lower than in the US and the need for physical protection through sons is likely minimal. And, obviously, there is no one-child policy to heed.

What Canada does share with India and China is access to technology for prenatal sex selection and a liberal abortion policy. In fact, Canadian abortion law is among the most permissive in the West. Moreover, abortion procedures are covered by public health insurance with no co-payments, rendering the monetary cost of an abortion negligible.

³For a formalization, see Ebenstein [2009].

Studying immigrants also provides two further insights. First, we contribute to a growing literature that studies the social, fertility, and labor market assimilation of immigrants across generations and ages of arrival (for the US, see Bleakley and Chin [forthcoming], Blau et al. [2008], for a comparison between the US and Canada; see Aydemir and Sweetman [2007]). Second, we can shed some light on the importance of the cultural versus cost explanations for abnormal sex ratios because they generate different predictions for the use of the family size and the mortality manipulation channels. Specifically, if son preference is just a cultural phenomenon, then we would expect the demand for sons to fade with cultural assimilation in the host country — whether manifested through the family size or the mortality manipulation channel. In contrast, the cost explanation posits a substitution between these two methods of achieving a male offspring.

Our empirical results show sex ratios to be abnormally large at higher parities if previous children have been all girls, confirming patterns recently documented for Asian immigrants to the US and the UK [Almond and Edlund, 2008, Abrevaya, 2009].⁴ Unlike with US Census data, however, we can go further to study assimilation across generations. We find higher sex ratios among first generation immigrants who arrived in adulthood. Moreover, while first generation immigrants exhibited higher sex ratios at third parity, they also seemed more willing to continue to a third birth than second generation immigrants. Second generation immigrants do not appear to use the family size channel, but we cannot reject that they still use sex selection to achieve sons.

Perhaps our most striking finding concerns (self-declared) religion — not recorded in US Census or natality data. Religion is interesting because it is typically a persistent aspect of culture, and the main religions differ in how they view infanticide (traditionally, the main method of sex selection). High sex ratios are entirely driven by immigrants who are neither Christian nor

⁴Additionally, Dubuc and Coleman [2007] found elevated sex ratios at higher parities among Indian immigrants to the UK, but did not observe the sex composition of older children.

Muslim, the highest sex ratio being found for Sikhs. For this group, there are more than 2 boys per girl for the third child if the two elder children were girls, implying a sex ratio that is 100% above the normal above for this group. By contrast, Asian immigrants who are Christian or Muslim (mainly from Pakistan, Bangladesh, the Philippines and Hong Kong) exhibit normal sex ratios, irrespective of parity and sex mix of previous children. This finding resonates with the research of Chung [2007], who finds that Christian South Koreans are much less likely to practice sex selective abortions than Confucians or Buddhists. Of course, the absence of skewed sex ratios could mirror an absence of sex preference, but that does not appear to be the case. Christian or Muslim parents were about 5 percentage points more likely to continue to a third child if the first two were girls, suggesting that the explicit bans on post-natal sex selection (infanticide) in these religions may also protect the unborn girl against prenatal sex selection.

The remainder of the paper is organized as follows. The next section provides some institutional background on immigration to Canada, prenatal sex choice options, abortion access in Canada, and religious prohibitions against sex choice. Section 3 describes the Canadian census microdata and our analysis sample, Section 4 our results, and Section 5 concludes with a brief discussion.

2 Institutions

Several features of the environment for Asian immigrants in Canada combine to make their study uniquely informative. The levels of immigration are high, sex determination technology is readily available, and abortions are publicly funded without legal impediment.⁵ This generates an environment with a sizeable proportion of the population having cultural attachment to

⁵We focus on abortion because we consider it unlikely that explicit infanticide occurs in Canada. Also, with public health insurance, the concern of differential access to health post-birth is somewhat alleviated as there is no cost to the user. Since administrative mortality data are not available by race or ethnic origin, we can not explicitly test for differential death rates post-birth for Asian-Canadians. Abrevaya [2009] finds explicit evidence in California that abortion is the likely channel for sex selection for Asian-Americans.

countries known to feature son preference and with relatively easy access to means to act on that preference. Below we provide a brief background of Asian immigration to Canada, prenatal sex determination, and religious and cultural attitudes towards sex selection.

2.1 Asian immigration in Canada

Canada's population is one of the most immigrant-intensive in the industrialized world.⁶ The stock of foreign born in Canada in 2006 was 19.8 percent, about 50 percent higher than the United States, and double the rates for Britain, the Netherlands, and France.⁷ The top-two destination cities, Toronto and Vancouver, have foreign-born shares of 45.7 percent and 39.6 percent, which exceed levels seen in the top US immigration destinations of Miami (36.5), Los Angeles (34.7), and New York (27.9).

Annual immigration to Canada is around 0.7 percent of population; about double the corresponding rate in the United States.⁸ The top-five source countries in 2007 were the People's Republic of China, India, the Philippines, the United States, and Pakistan. Asia and the Pacific region have accounted for around 50 percent of immigrants since the 1980s — a trend that started after reforms to immigration in the 1960s. A point system governs the entrance of skilled workers, and 20 to 25 percent of immigrants over the past decade have entered under this system. The balance enter through other channels such as family class, spouses and dependants of skilled workers, entrepreneurs, investors, or refugees. The issue of access to social services by undocumented immigrants is much less relevant in Canada

⁶Except where otherwise noted, the statistics in this paragraph come from "Immigration in Canada: A Portrait of the Foreign-born Population, 2006 Census" Statistics Canada, 2007. Catalogue 97-557-XIE <http://www12.statcan.gc.ca/english/census06/analysis/immcit/pdf/97-557-XIE2006001.pdf> The data on the United States come from this Statistics Canada publication, but are derived from the 2006 American Community Survey. See Green and Green (1995) for details on the evolution of Canada's immigration system and an analysis of the point system.

⁷Source: OECD Factbook 2009.

⁸The statistics in this paragraph are from "Facts and Figures: Immigration Overview Temporary and Permanent Residents 2007" Citizenship and Immigration Canada. <http://www.cic.gc.ca/english/pdf/pub/facts2007.pdf>.

than the US. Quebec maintains a separate immigrant policy, with the result that a much lower proportion of Asian immigrants arrive in Quebec than other provinces. Of all Asian immigrants in 2007, 24 percent settle in British Columbia (mostly in and around Vancouver) and 51 percent in Ontario (mostly in and around Toronto).

2.2 Prenatal Sex Determination

Prenatal sex determination is controversial, but nonetheless available in Canada. The Society of Obstetricians and Gynaecologists of Canada has condemned sex determination that leads to selective abortion as ‘discriminatory’, and the British Columbia College of Physicians and Surgeons have categorized fetal gender determination for non-medical purposes as ‘unethical.’ Sex determination is actively discouraged in the medical community. However, in practice, there are ways around this. First, one could find a health care provider willing to overlook the policy. Second, in British Columbia sex determination clinics across the nearby border in the U.S. (Washington state) are available and advertised in immigrant communities.

Sex determination using ultrasound visualization is the dominant form worldwide. In Canada, ultrasound examinations are part of routine prenatal care and are available free of charge to the patient. Imaging has improved and today fetuses can be sexed towards the end of the first trimester when differentiation of the external sex organs occurs (between weeks 10 and 12). Many studies have shown that accuracy rates after week 12 are quite high. For example, Efrat et al. [2006] found an accuracy rate between 12 and 14 weeks of 99.6 % for males and 97.4 % for females; although 7% of pregnancies could not be sexed. Other methods, such as blood tests, sperm sorting, or in-vitro selection are not yet reliable, expensive, or both. In 2004, the Assisted Human Reproduction Act⁹ made it a crime:

for the purpose of creating a human being, [to] perform any pro-

⁹English text available at:
http://laws.justice.gc.ca/en/showdoc/cs/A-13.4/bo-ga:s%5C_5/20090911/en

cedure or provide, prescribe or administer any thing that would ensure or increase the probability that an embryo will be of a particular sex, or that would identify the sex of an in vitro embryo, except to prevent, diagnose or treat a sex-linked disorder or disease.

Interestingly, despite making it illegal, the law's authors did not consider the practice unethical if geared toward gender-balancing [Dickens et al., 2005].

2.3 Abortion in Canada

Abortion law in Canada is among the least restrictive in the world. Prior to 1988, abortions were governed by Section 251 of the Criminal Code, which required case-by-case certification by a hospital's Therapeutic Abortion Committee. In 1988, the watershed *R. v. Morgentaler* decision of the Supreme Court of Canada determined that Section 251 violated the Canadian Charter of Rights and Freedoms. A legislative attempt to replace the abortion law failed in 1989, and no subsequent legislation has been introduced. The result is a society with no legal barrier to abortion, no matter the gestational age of the fetus.

Beyond legal barriers, other factors can also potentially limit abortions. First, doctors might not be available to perform the abortion. This can arise for women in more rural parts of the country and in some provinces and territories. For example, for many years there have been no abortions performed in Prince Edward Island for want of facilities. However, because a large majority of Asian immigrants lives in large cities, physical access is less of an issue for the Asian-Canadian population.

Second, cost can be prohibitive. In Canada, however, abortions in hospitals are covered by the universal public health plan in every province and territory, and private clinic abortions almost everywhere as well. The indirect costs of travel and time are not covered, but for the mostly urban

immigrant population these costs are less important.

2.4 Cultural Prohibitions Against Sex Selection

At the times of the early Church and the Quran, infanticide was the main form of sex selection, and both Christianity and Islam took strong positions against it. For obvious reasons, neither religion pondered the question of sex selective abortion, but it is possible that the proscription against post-natal sex selection has rendered sex selection taboo, thus protecting the unborn girl. To the best of our knowledge, there are no equivalent proscriptions in the other main religions (including Confucianism). While no religion advocates infanticide, Christianity and Islam stand out as proscriptive.¹⁰ Below follows a very brief account.

Abortion, infanticide and child abandonment were permitted under Roman law at the time of Jesus. With available technology, only infanticide could be done according to sex, and but it was widely used to that end, as this well known excerpt from a letter dated around 1B.C. illustrates (quoted in Stark [1997]).

“Know that I am still in Alexandria.... I ask and beg you to take good care of our baby son, and as soon as I received payment I shall send it up to you. If you are delivered (before I come home), if it is a boy keep it, if a girl, discard it.”

The early Church banned both abortion and infanticide [Stark, 1997].

The Quran does not explicitly ban abortion (nor does the Bible) but does take a strong position against female infanticide, widely practised in pre-Islamic Arabia. On the day of reckoning, the Quran (At-Takwir: 8-15) reads:

“When the female infant, buried alive, is questioned — for what crime was she killed; when the scrolls are laid open; when the

¹⁰Judaism also condemns infanticide, but this religion has very few followers in South, South-East and East Asia.

World on High is unveiled; when the Blazing Fire is kindled to fierce heat; and when the Garden is brought near — Then shall each soul know what it has put forward. So verily I call.”

3 Data

The Canadian Census is conducted every five years, with slightly more detailed questions asked in enumeration years ending with a ‘1’. The coverage is universal and mandatory, with 20 percent of private occupied households selected for the detailed ‘long form’ and 80 percent for the more cursory ‘short form’. All long form respondents are included in the master file, which is available for some Census years through special arrangement at Research Data Centres. The data include information on the location, income, education, immigration history, dwelling, and family structure for each individual. The data are available at the individual level, with hierarchical identifiers permitting the recreation of families and households.

We focus on the 2001 and 2006 Census years. The primary difference between these two survey instruments for our purposes is the availability of religion in 2001. Our results in the 2001 and 2006 samples typically look very similar, the main benefit of pooling these two years is sample size.

We draw a sample of two-parent families with children subject to three selection criteria. First, we require the youngest three children to be born in Canada. This assures that the children in the sample were all born in the same institutional environment — and not subject to family size restriction as in, for example, China. Second, we restrict our focus to families where the oldest child is age 12 or younger. We seek to reconstruct the family structure as it was at the birth of each child. When a family has older children in the household, the possibility of a missing older sibling (who has already left the home) increases. This motivates our focus on families with younger children. Third, we exclude families with multiple births because we are interested in the sequential decision by parity, and multiple births

introduce a more complex parity structure. Compared to the US Census, the resulting sample sizes for each Census year are much larger because of the larger share of foreign-born in Canada, a higher fraction of Asians among immigrants to Canada, and the larger 20 percent sample.¹¹

Exact date of birth is reported for each family member. Using this information, we code variables for whether a child of each parity was born, and if so, the sex. These form the dependent variables for the analysis. We also code variables for the sex mix of existing children at each parity. These variables are used both to define our samples and as explanatory variables.¹²

The Canadian Census contains information on each individual's ethnicity and country of birth.¹³ We also observe each person's parents' country of birth. Children in the sample can be linked to their parents, for whom we know the parents' places of birth. Consequently, for each child we can observe both the parents' and the grandparents' country of birth, meaning we can distinguish between first and second generation immigrant families (not possible using US Census data after 1970).

We create a sample of first and second generation immigrant families from South, South East and East Asia. We do so by selecting all families for which at least one of the grandparents was born in South or East Asia. Since most Asian immigrants arrived after the 1960s, we capture a large percentage of the Asian-Canadian population. An alternative is to use self-reported ethnicity. However, those who are more assimilated may be more likely to identify with 'Canadian' ethnicity, making it more difficult to use ethnicity to study assimilation. Results using ethnicity to classify families show similar patterns and magnitudes to those we report here. Some descriptive statistics

¹¹For instance, Almond and Edlund [2008] found 324 families of Chinese, Korean, or Indian origin who had a third child after two girls in the US Census. The 2001 Canadian census yields almost three times as many families of this type.

¹²Divorces, remarriages, deaths, and adoptions could compromise our family reconstruction. We can create an indicator of success for family reconstruction using the public-use 1991 Census, which records the number of children ever born. We select families with mother or father born in Asia and compare the number of children ever born to the number currently living at home. For children age 0-5, 94.7 percent of families have the same number ever born and still at home. For children age 6 to 14, 90.9 percent are the same.

¹³There is no 'race' categorization.

for our sample and subsamples are provided in Table 1.¹⁴

4 Son preference among Asian immigrants

In presenting our results, we first lay out the basic findings in graphs of sex ratios by sex mix and parity of birth. Second, we probe these results in greater detail in a multivariate regression analysis.

4.1 Figure 1

Figure 1 displays sex ratios (males to females) for different family characteristic groups, arranged in four panels. Each set of three bars shows the sex ratio for first children, second children when the first was a girl, and third children when the first two were girls. Each sex ratio has the mean reported above the bar, and a 95 percent confidence interval marked. The underlying sample size is noted at the bottom of each bar. A line is drawn at the approximate biological norm of 1.05 for comparison.

Panel A of Figure 1 considers country of origin. Most of the existing literature studies one country at a time or country of origin for immigrants, so the breakdowns in Panel A allow comparison of our results to the existing literature. Each country sample is chosen by keeping all families with at least one grandparent born in that country.¹⁵ We show the results for India, ‘China plus’ together with Korea and Vietnam, and the Philippines. Sex ratios for first births are only slightly higher than biological norms, coming in between 1.08 and 1.09 for all three of our country groups. The 95 percent confidence interval includes 1.05. The sex ratio for second children when the

¹⁴Here and in all of our tables and figures the sample sizes have been rounded to a ‘0’ or a ‘5’ using a randomized procedure in accordance with Statistics Canada disclosure policy. This procedure means that, because of rounding, mutually exclusive and exhaustive components may not exactly add to reported totals.

¹⁵This introduces some complications, since national boundaries have not been stable, with the partition of India and the impact of the Chinese revolution being pertinent to our study. For India, about five percent of observations with the grandparents being reported born in India have the parents born in Pakistan. For China, we group together the People’s Republic, Taiwan, Macau, Hong Kong, and Singapore into an aggregation we call ‘China plus.’

first is a girl is elevated in India at 1.19, which is statistically significantly different than 1.05. A much sharper contrast is evident for third children with two girls first. In India, the sex ratio is 1.90, with a 95 percent confidence interval reaching down to 1.67. For China plus, Korea, and Vietnam, the sex ratio is 1.39, which is statistically different than 1.05.¹⁶

The Philippines provides a stark counter-example, with sex ratios within the biological norm for all parities — including third children preceded by two girls.¹⁷ This provides a strong indication that broadly Asian genetic or cultural factors cannot explain elevated sex ratios. The Philippines does have several unique cultural features — such as non-patriliness and Catholicism — but this serves to suggest that local and potentially malleable cultural factors determine attitudes toward sex and abortion. We therefore consider whether, within immigrant groups with high sex ratios, there are dimensions along which we observe assimilation toward more balanced sex ratios.

Panel B of Figure 1 shows sex ratios for families classified by the origins of the grandparents. The first set of bars indicates the sex ratios of families in which all four grandparents are Canadian-born — these families have parents who are at least third generation Canadian, the vast majority of whom are of European ethnicity. Given our interest in assimilation, this set of bars provides the ultimate “native” comparison group. Sex ratios for these families are 1.05 for first births, 1.08 for second births (with girl first), and 1.06 for third births (with two girls first). The large sample size leads to very small confidence intervals. These sex ratios are within biological norms.

The second and third set of bars in Panel B show the sex ratios for families with South or East Asian-born grandparents. In the middle are families with either one or two South or East Asian-born grandparents and on the

¹⁶In the three countries making up this grouping, the results for the third parity are 1.38 for China plus, 1.62 for Korea, and 1.42 for Vietnam.

¹⁷The slight decline in sex ratio at higher parities is a standard finding [Chahnazarian, 1988].

right are those with three or four South or East Asian-born grandparents (i.e. mutually exclusive sets). Sex ratios for first births are slightly higher than 1.05, but only marginally. For second births, the sex ratios are slightly elevated, to 1.13 for those with 1 or 2 South or East Asian-born grandparents and 1.11 for those with 3 or 4. The largest sex ratios are for third births with the first two children being girls. Those families with 3 or 4 South or East Asian-born grandparents have 1.45 boys for every girl, and those with 1 or 2 South or East Asian-born grandparents have 1.21 boys for every girl. This suggests that less assimilated families (more Asian-born grandparents) have larger sex ratios — a point we develop in the regression analysis below.

We next examine the sex ratios of Asian immigrants by generation. Bleakley and Chin [forthcoming] showed that US immigrants arriving earlier in life are more likely to be socially assimilated. Also for the US, Blau et al. [2008] found that after two generations, only 16 to 42 percent of excess immigrant fertility remained, driven down by increased labor supply and education attainment, as well as possibly by cultural factors. While social assimilation may lead to sex ratios that approach native levels, the increased labor supply and decreased fertility may indicate an increase in the cost of using the family size channel to achieve male offspring. Thus, lower desired fertility may prompt more extensive use of the abortion channel to achieve a male offspring.

The first set of bars in Panel C of Figure 1 shows the sex ratios for families in which at least one parent is Canadian-born. The sex ratio for third births after two girls is 1.32. The middle and right-hand set of bars focus on families with both parents foreign born (1st generation immigrants), but split the sample into those in which the parents arrived after turning age 18, and those who arrived at younger ages.¹⁸ Immigrants who arrive during childhood have a sex ratio of 1.23 for third children when the first two are girls, which actually falls below that of second generation immigrants.

¹⁸Those with one parent arriving before and one after age 18 are grouped with those having both parents arriving before age 18.

This does not indicate assimilation effects — although the difference is not statistically significant. The sex ratio for families with both parents arriving after age 18 is 1.50 for third children with two girls first. The size of this sample makes for a smaller 95 percent confidence interval, reaching down only to 1.34. This leaves mixed initial evidence of the impact of assimilation on sex ratios.

Finally, we turn in Panel D of Figure 1 to religion, where the sample includes families with at least one South or East Asian-born grandparent. Religion is only available in 2001, so sample sizes are smaller than the first two panels which included data from both 2001 and 2006. Strikingly, the sex ratios for families with Christian or Muslim parents show little indication of heightened sex ratios, with a ratio of 1.01 for third births after two girls. Approximately half of this sample originates from the Philippines, which features a non-patrilineal culture. However, the same pattern occurs for Asian Christians who are not Filipino. The middle set of bars displays results for all non-Christian and non-Muslims. This set of families displays a heightened 1.98 sex ratio for third births with two girls first.¹⁹ The right-hand set of bars pulls out Sikh families who have the highest sex ratio we observe among the religious groups, at 2.07.

4.2 Basic regressions

We proceed with the analysis by running regressions of the form:

$$Y_i = \beta_0 + X_i\beta_1 + AllGirls_i\beta_2 + Mix_i\beta_3 + u_i. \quad (1)$$

We consider two dependent variables. The first is an indicator that the family had another child. If we include all families with one child facing the birth of a second, some of these families may have another child in the future but haven't yet. To account for this possibility, we restrict the sample to families where the previous child was age six or older, which provides a

¹⁹The religious composition of our 2001 sample is: 40.3 % Christian, 16.6 % Sikh, 14.8% other, 10.3 % Hindu, 9.0% Muslim, and 8.9% Buddhist.

more complete picture of whether that family had a subsequent child. For the ‘second child’ sample, we include all families with a first child age six or higher and form the dependent variable as taking the value one when a second child is present. For the ‘third child’ sample, we include all families with at least two children and in which the second child is at least 6 years old. The dependent variable in this case takes the value one when a third child is present. The other dependent variable is an indicator that the child of the indicated parity is a boy. We impose no age restriction on these regressions beyond those listed in the data description.

The key independent variables of interest are $AllGirls_i$ and Mix_i . $AllGirls_i$ takes the value 1 when all the previous children are girls. Mix_i takes the value 1 when the previous children are a mix of boys and girls. The excluded category is an indicator for both children being boys. In the second child sample, there is only one previous child so $AllGirls_i = 1$ indicates the first child was a girl, and Mix_i is omitted. In the third child sample, both variables are included.

The X_i vector contains a set of demographic covariates for the family. We include dummies for father and mother age group, father and mother education, city of residence, and a dummy for records from the 2006 census.²⁰ The results are very similar in specifications that omit the entire X_i vector.

The equations are estimated using a linear probability model with robust standard errors which account for the heteroskedasticity of the linear probability model residuals. Table 2 presents the results for four different samples. Results under *Had* are for the dependent variable indicating the family had the indicated parity child, while those under *Boy* are for the dependent variable for the family having a boy of the indicated parity. We show results for second and third parities.

²⁰The age groups we use are 24 and under, 25 to 29, and 30 and above. We use the age at the birth of the first child, since age at the birth of the current child is potentially endogenous. For education, we code three dummies: high school or less, some post-high school education, and university degree. For city of residence, we include dummies for Vancouver-Abbotsford and for Toronto, leaving all other cities and rural areas as the left-out category.

The first panel of Table 2 contains the results for the sample of families having both parents born in South or East Asia, making these families first generation immigrants. After the birth of a girl, these families are 2.2 percentage points more likely to have a second child over the next six years than those who had a boy. This indicates a slight preference for boys, but while statistically significant, it is not large compared to the mean of 0.56 for those with a boy first. Among those having a second child, those with a girl first were 2.1 percentage points more likely to have a boy. Again, while statistically significant, this effect is not large. The next two columns show third births. Here, we see a large 19.3 percentage point difference in having a third child if the first two were girls, relative to the 18.5 percent mean when the first two were boys, i.e. a doubling of the continuation rate. There is also a relatively small but still significant 4.0 percentage point lower probability of having a third child if the first two were of mixed sex, indicating a slight preference for a sex mix. The point estimate for having a boy when the first two are girls is 8.4 percent among first generation immigrants, which is nearly identical to the unadjusted estimates.²¹

The second panel of Table 2 runs the same specifications for second generation immigrants. This sample of families has at least one grandparent born in South or East Asia, but has at least one parent born in Canada. Because so much Asian immigration has taken place over the last 30 years, the sample sizes for the second generation are about a quarter of those for the first generation sample. For second births, the effects are small and comparable to the first generation estimates. In contrast, the third birth results show strong differences. Families having two girls first are somewhat *less* likely to have a third child within six years than families with two boys first, with an estimated coefficient of -0.053, significant at the 10 percent

²¹To express this parameter in terms of sex ratios, the probability of having a boy if the first two children are boys in our sample happens to be exactly 0.500. An 8.4 percentage point increase in this probability increases it to 0.584, which produces a sex ratio adjusted for covariates of 1.404. This is very close to the unadjusted sex ratio of 1.415 for this same sample, indicating that controlling for covariates is playing little role in our estimates.

level. There is also a much stronger preference for mixed sex families evident, with a 12.2 percent increase in the probability of stopping after two children when the first two are mixed compared to the first two being boys. Finally, the probability of having a boy third is 4.6 points higher when the first two kids are girls compared to the first two being boys. This coefficient is about half the size of the coefficient in the first generation sample, but the standard error is larger in this smaller sample.

The bottom two panels of Table 2 disaggregate the sample of families having South and East Asian-born grandparents into Christian/Muslim and other religions samples. The effects in both of these samples for second births are small. But, both religious subsamples display a significant preference for having a third child when the first two are girls. However, the magnitude of the coefficient for non-Christian or non-Muslims is five times (0.247 compared to 0.050) the coefficient for Christians and Muslims. Notably, while Christians and Muslims' decisions to have a third child show a preference for achieving a sex mix, other religious groups do not (-0.062 versus -0.016).

The difference between the religion subsamples is larger still where the sex of the third child is concerned. While essentially unaffected for Christians and Muslims, among other religious groups the probability of having a boy third increases by 12.3 percentage points when the first two children are girls relative to boys. This regression coefficient delivers an adjusted sex ratio of 1.976, very close to the 1.982 visible in Panel C of Figure 1.

These first regressions bring forward the following three important findings. First, following two children, the probability of having a third child and the third child's sex depend strongly on the sex mix of previous two children. Next, second generation immigrants show much less propensity to keep having children when the first two are girls than do first generation Asian immigrants, consistent with an assimilation effect. Finally, Christians and Muslims manifest sex preference through stopping behaviors alone, while both sex ratios and stopping behaviors are apparent for other religions.

4.3 Immigrant Assimilation

Does the duration of time spent in Canada provide additional information about immigrant son preference, or is it subsumed by other factors? We estimate multivariate regressions for all families with at least one grandparent born in South or East Asia, effectively pooling together first and second generation immigrants. Here, we include three region of origin dummies to control for differences across source countries. We also include three immigrant cohort dummies for each of the mother and father to control for differences across immigrant arrival cohorts, which will help distinguish between age of arrival versus cohort of arrival effects.²² The other variables are defined as in Section 4.2 above. Finally, we restrict attention to families with two or more children.

The key right-hand side variables of interest are indicators of the sex mix of previous children and their interaction with measures of “Canada exposure.” For immigrant generation, we code a variable indicating that both parents are foreign-born, i.e. first-generation immigrants.²³ We also code a variable indicating that both parents are first generation immigrants arriving after age 18.

In the Table 3 results, families with two girls first are 14.6 percentage points more likely to have a third child than when the first two children were boys (column 1). The decision to continue childbearing also reveals a preference for sex mix. First generation parents are 3.2 percentage points less likely to have a third child (irrespective of sex composition). In the right-hand panel, the results for having a boy third are quite different. Here, the only significant gender impact follows two girls, with a 7.2 percentage point increase in the probability of having a boy.

The middle columns of the table interact the family structure variables with the immigrant indicator, allowing first generation immigrants to react

²²For the mother and the father, we form variables identifying immigrants arriving before 1980, 1980-1989, 1990-94, and 1995 and later.

²³In our sample, about 77 percent of observations have both parents as first generation immigrants, 8 percent as second generation, and 15 percent as one first and one second.

differently to gender compared to second generation immigrants. For having a third child, first generation immigrant families are 24.9 percentage points more likely than second generation families to have a third child if the first two are girls. The first generation families are also more likely to continue to a third child if the first two are mixed rather than boys. The -0.132 coefficient on the first generation variable indicates that first generation families with two boys first are 13.2 percentage points less likely than second generation immigrants to have a third child if the first two are boys. Putting these together, this evidence indicates a much stronger preference for boys among first generation immigrant families. This may result from a higher proclivity of newer immigrants to have larger families, as more established immigrants have assimilated either culturally or through the labor force into Canadian family size norms.

It is possible that there is a tradeoff between larger families and selective abortion as a path to having more sons, e.g., Ebenstein [forthcoming]. If so, a higher proclivity for using the family size channel might lead to lower use of the abortion channel and vice versa. Son preference may be similar across generations, but asymmetry along other dimensions (which may respond to assimilation) may change the means by which it is expressed. In contrast, if assimilation affects the taste for sons, then we should see assimilation effects on both the abortion channel and the family size channel that go in the same direction.

For child sex, the effect of having previous girls is now split between an effect for second generation and first generation immigrants. What was a large and significant 7.2 percentage point impact on having a boy (column 4) is decomposed into a 4.3 percentage point effect for second generation immigrants and an additional 3.7 percentage point effect for first generation immigrants (column 5). However, neither of these effects is in itself statistically significant. So, we do not have clear evidence to distinguish between the hypothesis that son preference in general went down (manifested through either channel) and that there was substitution between the channels.

Columns 3 and 6 of Table 3 further break down the first generation effect into one for those arriving before and after age 18. For having another child, the coefficients are largely unchanged when heterogeneity in effects for adult immigrants is introduced (column 3), meaning that there is no distinction between the behavior of early and late arriving first generation immigrants — although the strong distinction between first and second generation immigrants remains. In contrast, the coefficient of the interaction of being first generation and having two girls first now goes close to zero, with the age 18 interaction term taking the value 0.044 (column 6). Although statistically insignificant, the confidence interval includes a substantially higher degree of sex selection for adult immigrants.

Our findings on assimilation indicate that first generation immigrant families from South and East Asia are much more likely to exhibit son preference in their family size choices than are second generation families. However, the results for the sex of born children show less difference across generations. This suggests that, while cultural assimilation may attenuate son preference somewhat, this does manifest differently across channels. Thus, in a relative sense there are signs of substitution toward the abortion channel from the family size channel.

4.4 Religion

The 2001 Census allows us to examine the relationship between religion and son preference, as reflected by fertility decisions.²⁴ Since religion is a fairly tenacious aspect of culture, exploring how religion affects assimilation is particularly interesting. We form a sample of families with at least one parent being Christian or Muslim, and the complement sample containing

²⁴The results in Table 4 use only the 2001 Census. In comparable regressions, however, the results in the two years are extremely similar. Using the same specification as Table 2 for having a boy for a third child, the coefficient (standard error) on having two girls first is 0.076 (0.017) in the pooled dataset, and 0.072 (0.025) in the 2001 dataset. For having another child, the coefficient in the pooled dataset is 0.144 (0.013) and 0.154 (0.020) in the 2001 dataset.

no Christians or Muslims.²⁵ Again, we restrict attention to families with two or more children.

In Table 4 we report the results of regressions similar to Table 3, but on the two religious subsamples. The top panel contains the regressions with the dependent variable indicating the birth of a third child, among those with two children (and with the 2nd child of age at least 6). The bottom panel has the results for families with at least three children, using as a dependent variable an indicator that the third child was a boy.

The top left set of results compares the propensity to have a third child of Christians and Muslims and those of other religions. Among Christians and Muslims, there is a slight 5.2 percentage point effect for having a third child if the first two were girls compared to the first two being boys. There is also an indication of a preference for sex mix, as these families are 6.2 percent less likely to continue to a third child if the first two children were of mixed sex. In contrast, Asian-Canadian families that are neither Christian nor Muslim show a very strong indication of a continuation preference if the first two children are girls, with a 25.6 percentage point increase in the probability of having a third child.

The third and fourth columns allow these effects to vary between the first and second generation of immigrants. Now, the first two rows show the results for the second generation while the last two rows of the top panel show the differential effect for first generation immigrants. Strikingly, the son preference is driven almost entirely by the first generation for both sets of religious groups. The continuation probability for the second generation immigrants if the first two children were girls is now insignificant (with a negative point estimate) for both religious groups, while for those with mixed sex among the first two children the estimated coefficients are very close across the two religious groupings. For the first generation immigrants, however, the effect of having two girls is positive and significant. For non-

²⁵We have checked the results in a specification that allows for six different religious groups, but found that the results led naturally to the Muslim/Christian vs. other groupings.

Christian and Muslim first generation families, the probability of continuing to a third child if the first two were girls is 42.0 percentage points higher than for second generation immigrants of the same religion. These results strongly indicate a significant difference between first and second generation immigrants, across both religious groupings.

The bottom panel of Table 4 looks at the sex of the third child. In the first two columns son preference is only evident in the sample of non-Christians and Muslims, as seen earlier in Table 2. When this effect is broken down into a first and a second generation immigrant effect in the right-hand side of the bottom panel, the estimates become imprecise. Breaking the results down further into early and late arriving immigrants yields similarly uninformative estimates.

5 Discussion

We have documented a clear son preference among Asian immigrants to Canada. We uncover a strong tendency to continue having children in the absence of sons among first generation immigrants that entirely disappears among second generation immigrants. In contrast, we do not observe such a sharp decline in the tendency to select males over females (likely through abortion) across generations.

We also uncover an important exception — Asian immigrants professing to be Christian or Muslim do not appear to use abortion to select sons. Christian and Muslim families do, however, show a tendency to continue having children in the absence of male offspring, suggesting the existence of a son preference but a difference in how it is pursued. In both religious groupings we document stark declines in observed son preference between first and second generation immigrants.

Our findings provide further evidence on the persistence of a cultural preference for sons and the role of religious proscriptions against infanticide, which was traditionally the dominant method for sex selection. While no

main religion has advocated infanticide, Christianity and Islam stand out in their explicit bans of infanticide.

Be that as it may, in the West, sex selection for non-health reasons remains controversial [Dickens, 1986], and there has been little in the aggregate data to suggest that the sex preferences for offspring, expressed in, for instance, Gallup polls,²⁶ impact sex ratios. Instead, other margins, such as labor supply, marital status and family size, appear to be affected [Angrist and Evans, 1998, Lundberg and Rose, 2002, Dahl and Moretti, 2008].²⁷ Whether the taboo against sex selection using abortion will extend to protect girls once sex selection at pre-implantation becomes available and affordable remains an open question.

We end with a note on son preference and assimilation. It could be argued that unlike a preference for, say, high fertility, a preference for sons and a (relative) lack of aversion to sex selective abortion is not costly to maintain in the West. The opposite might even be true since assimilation of values would *raise* the psychic cost of sex selection. Of course, this ignores the physical cost of pregnancy and abortion, which may be given a greater weight at higher levels of affluence. This is not to say that the preference for sons is impermeable to cultural influence, including better social and economic status of women. However, our results suggest that assimilation is multidimensional. In fact, assimilation to lower fertility levels may prompt higher sex ratios among immigrants, just as the once-child policy may have raised sex ratios in China. Conceivably, this argument can be made more forcefully in the case of Asians in Canada, since by virtue of being a minority, the marriage market effects of excess males are muted.

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²⁶<http://www.gallup.com/poll/28045/Americans-Continue-Express-Slight-Preference-Boys.aspx>

²⁷Male biased sex ratios are commonly believed to be more likely and, possibly, a more problematic, outcome of parental choice.

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Table 1: Descriptive Statistics, Variable Means (Fractions)

	At Least One SE Asian Grandparent, Parents					
	4 GPs Canada ^a (1)	1+ GP SE Asia ^b (2)	Immigrated:		Christian/Muslim:	
			1st gen ^c (3)	2nd gen ^d (4)	Either ^e (5)	Neither ^f (6)
N	354,720	64,350	48,920	15,425	13,545	14,805
Boy first	0.513	0.517	0.517	0.518	0.517	0.516
Had 2 children	0.611	0.562	0.569	0.539	0.566	0.586
Boy 2nd, given had 2 children	0.509	0.516	0.515	0.518	0.521	0.509
Had 3 children	0.141	0.115	0.115	0.114	0.130	0.120
Boy 3rd, given had 3 children	0.511	0.539	0.539	0.535	0.508	0.583
Mother HS dropout	0.324	0.333	0.379	0.182	0.205	0.448
Mother HS grad	0.467	0.336	0.321	0.386	0.449	0.316
Mother Post-Secondary	0.209	0.331	0.300	0.432	0.346	0.236
Father HS dropout	0.364	0.323	0.359	0.203	0.195	0.418
Father HS grad	0.464	0.325	0.309	0.377	0.439	0.312
Father Post-Secondary	0.172	0.352	0.332	0.420	0.366	0.270
Mother up to Age 24	0.311	0.176	0.184	0.150	0.148	0.214
Mother ages 25 to 29	0.371	0.354	0.371	0.299	0.332	0.398
Mother age 30+	0.318	0.470	0.445	0.551	0.520	0.388
Father age up to 24	0.181	0.058	0.051	0.085	0.067	0.056
Father age 25-29	0.340	0.240	0.243	0.228	0.227	0.285
Father age 30+	0.479	0.702	0.706	0.687	0.706	0.659
South Asia, all four GP	0.000	0.315	0.390	0.072	0.144	0.426
China, Korea, Vietnam, (CKV), four GP	0.000	0.288	0.349	0.087	0.194	0.403
East Asia, except CKV, all four GP	0.000	0.137	0.167	0.036	0.235	0.055
Rest of the World/ mixed GP PoB	1.000	0.260	0.094	0.805	0.427	0.116
Vancouver/Abbotsford	0.028	0.220	0.216	0.234	0.175	0.267
Toronto	0.046	0.431	0.478	0.280	0.435	0.421
Mother Other Religion	0.136	0.240	0.229	0.278	0.054	0.406
Mother Hindu	0.000	0.099	0.122	0.019	0.007	0.182
Mother Muslim	0.001	0.057	0.067	0.022	0.121	0.000
Mother Sikh	0.000	0.138	0.165	0.043	0.004	0.258
Mother Christian	0.863	0.374	0.311	0.595	0.790	0.000

^a - All four grandparents born in Canada.

^b - One or more grandparents born in South East Asia.

^c - Both parents first generation immigrants, at least one grandparent born in South East Asia.

^d - At least one parent second generation immigrant, at least one grandparent born in South East Asia.

^e - At least one parent Christian or Muslim, at least one grandparent born in South East Asia.

^f - Neither parent Christian or Muslim, at least one grandparent born in South East Asia.

Table 2: Son preference by parity, South/East Asian immigrant generation, and religion

	Second Child		Third Child	
	Had (1)	Boy (2)	Had (3)	Boy (4)
<hr/>				
	First Generation South/East Asian Immigrants			
<i>N</i>	24835	27775	10165	5630
All Girls	0.022 (0.005)	0.021 (0.007)	0.193 (0.015)	0.084 (0.020)
Mix	–	–	-0.040 (0.012)	0.016 (0.019)
<hr/>				
	Second Generation South/East Asian Immigrants			
<i>N</i>	6780	8370	2765	1720
All Girls	0.008 (0.011)	0.030 (0.012)	-0.053 (0.029)	0.046 (0.037)
Mix	–	–	-0.122 (0.025)	0.009 (0.032)
<hr/>				
	South/East Asian Christian or Muslim 2001			
<i>N</i>	6640	7740	2660	1730
All Girls	-0.003 (0.011)	0.020 (0.013)	0.050 (0.029)	-0.008 (0.037)
Mix	–	–	-0.062 (0.024)	0.009 (0.033)
<hr/>				
	South/East Asian Neither Christian nor Muslim 2001			
<i>N</i>	7275	8680	2895	1775
All Girls	0.020 (0.010)	0.024 (0.012)	0.247 (0.028)	0.123 (0.035)
Mix	–	–	-0.016 (0.023)	-0.015 (0.035)

Also included: dummies for three education groups for mother and father, three age groups for father and mother, three city/regions, and a 2006 dummy.

Table 3: Son preference across South/East Asian immigrant generation and age of arrival — families with two or more children

	Had Third Child			Third Child Boy		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>N</i>	12930	12930	12930	7350	7350	7350
All Girls	0.146 (0.013)	-0.053 (0.029)	-0.053 (0.029)	0.072 (0.018)	0.043 (0.037)	0.043 (0.037)
Mix	-0.057 (0.011)	-0.126 (0.025)	-0.126 (0.025)	0.011 (0.017)	0.010 (0.033)	0.010 (0.033)
MomDad1st ^a	-0.032 (0.019)	-0.132 (0.028)	-0.125 (0.031)	-0.007 (0.027)	-0.018 (0.037)	-0.014 (0.042)
MomDad1st × Girls		0.249 (0.033)	0.229 (0.040)		0.037 (0.042)	0.005 (0.052)
MomDad1st × Mix		0.085 (0.028)	0.082 (0.034)		0.003 (0.038)	0.014 (0.048)
MomDad18+ ^b			-0.014 (0.024)			-0.004 (0.036)
MomDad18+ × Girls			0.027 (0.033)			0.044 (0.043)
MomDad18+ × Mix			0.005 (0.027)			-0.016 (0.042)

^a – Both parents first generation immigrants.

^b – Both parents arrived when 18 or older.

Also included: Three region dummies, South Asia (Pakistan, India and Bangladesh), CKV (China, Korea, Vietnam), East Asia excluding CKV; three immigration cohort dummies for mother and for father; dummies for three education groups for mother and father, three age groups for father and mother, three city/regions, and a 2006 dummy.

Table 4: Son preference and assimilation across religious groups — families with two or more children

	Just Christians Muslims (1)	Not Christians Muslims (2)	Just Christians Muslims (3)	Not Christians Muslims (4)
	Had Third Child			
<i>N</i>	2660	2895	2660	2895
All Girls	0.052 (0.029)	0.256 (0.028)	-0.042 (0.052)	-0.125 (0.085)
Mix	-0.064 (0.024)	-0.012 (0.023)	-0.142 (0.043)	-0.151 (0.073)
MomDad1st	-0.040 (0.035)	-0.100 (0.045)	-0.131 (0.050)	-0.268 (0.072)
MomDad1st × Girls	–	–	0.137 (0.063)	0.420 (0.090)
MomDad1st × Mix	–	–	0.115 (0.051)	0.153 (0.077)
	Third Child Boy			
<i>N</i>	1730	1775	1730	1775
All Girls	-0.004 (0.037)	0.118 (0.035)	0.000 (0.064)	0.031 (0.102)
Mix	0.008 (0.033)	-0.018 (0.035)	0.075 (0.054)	0.021 (0.090)
MomDad1st	-0.017 (0.048)	0.033 (0.063)	0.033 (0.065)	0.028 (0.088)
MomDad1st × Girls	–	–	-0.012 (0.078)	0.094 (0.109)
MomDad1st × Mix	–	–	-0.105 (0.068)	-0.044 (0.097)

Also included: The same control variables as Table 3.

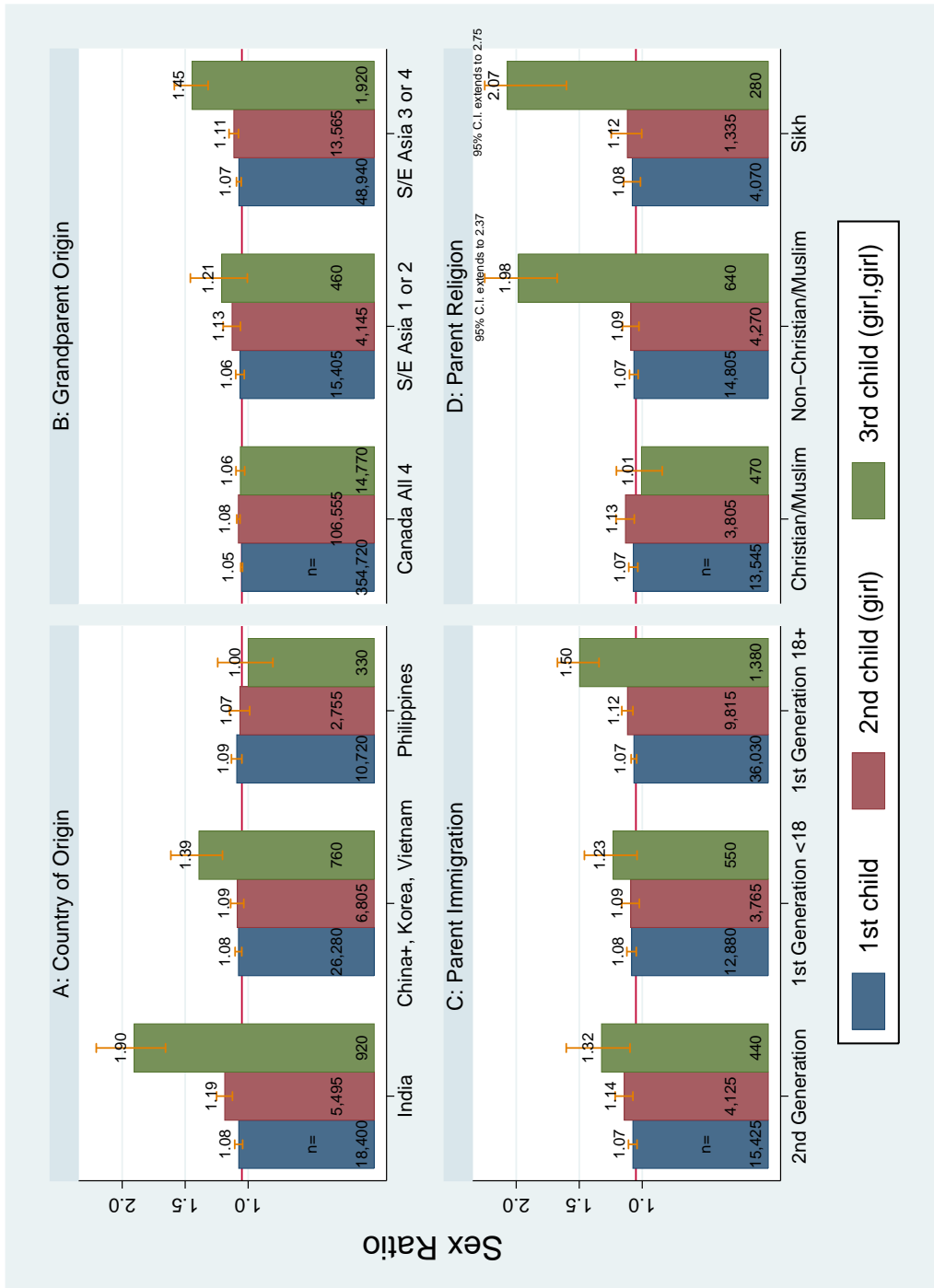


Figure 1: Sex Ratio Among South/East Asian Immigrants to Canada