

NBER WORKING PAPER SERIES

O SISTER, WHERE ART THOU? THE ROLE OF SON PREFERENCE AND SEX CHOICE:
EVIDENCE FROM IMMIGRANTS TO CANADA

Douglas Almond
Lena Edlund
Kevin Milligan

Working Paper 15391
<http://www.nber.org/papers/w15391>

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
October 2009

We thank Donna Feir for excellent research assistance. This paper was previously titled: Son Preference and the Persistence of Culture: Evidence from Asian Immigrants to Canada. We are grateful for comments received at the Chinese University of Hong Kong, the NBER Summer Institute, Ohio State, Seoul National University, Simon Fraser, UBC, and IFAU; and also for comments from Sonia Laszlo. This paper represents the views of the authors and does not necessarily reflect the views of Statistics Canada nor or the National Bureau of Economic Research. The data used in his article can be obtained through application to the Research Data Centre program at <http://www.statcan.ca/english/rdc/index.htm>.

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O Sister, Where Art Thou? The Role of Son Preference and Sex Choice: Evidence from Immigrants to Canada

Douglas Almond, Lena Edlund, and Kevin Milligan

NBER Working Paper No. 15391

October 2009, Revised October 2010

JEL No. F22,J13,J61,Z12

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.

Douglas Almond
Department of Economics
Columbia University
International Affairs Building, MC 3308
420 West 118th Street
New York, NY 10027
and NBER
da2152@columbia.edu

Kevin Milligan
Department of Economics
University of British Columbia
#997-1873 East Mall
Vancouver, B.C.
CANADA V6T1Z1
and NBER
kevin.milligan@ubc.ca

Lena Edlund
Department of Economics
Columbia University
1002A IAB, MC 3308
420 West 118th Street
New York, NY 10027
and NBER
le93@columbia.edu

Abstract

What determines the preference for sons evident in abnormal sex ratios at birth in countries such as India and China? Is the son preference just a reflection of the prevailing economic environment, notably poverty, few economic opportunities for women, and largely rural economies? If so, we would expect these patterns to vanish with economic development. In this paper, we study South-East Asian immigrants to Canada, a country where the economic rationale for son preference is arguably small to inconsequential. Canada has one of the largest immigrant populations in the world and universal health care rendering prenatal sex determination and abortion readily available. Analyzing the 2001 and 2006 Censuses, 20% samples, we find strong evidence of sex selection at higher parities if previous children were girls. Comparing first and second generation immigrants, we find assimilation to be stronger on the fertility margin than the sex choice margin, in fact, second generation immigrants were more likely to sex select on second parity than first generation immigrants. Lastly, we uncover stark differences across religions. While immigrants of Christian or Muslim profession preferred sons as evidenced by continued fertility following only daughters, there was little evidence of sex selection. Absence of sex selection among Christians and Muslims accord with explicit prohibition against (female) infanticide – traditionally the main way to manipulate offspring sex ratios – in these religions.

Introduction

Better to have a crippled son than eight healthy daughters.

Chinese saying

This [son] preference is not simply an expression of feudalistic mentality. It is very much dictated by highly labor-intensive agricultural and related pursuits.

Tien [1991, page 202].

The last decades have seen male and rising sex ratios at birth in a number of Asian countries — notably India and China [Miller, 1981, Das Gupta, 1987, Banister, 1987, Zeng et al., 1993, Coale and Banister, 1994, Tuljapurkar et al., 1995, Scharping, 2003, Li, 2007, Chung, 2007]. In China, more than 120 boys were born per 100 girls in 2005 [Li, 2007]. Initial claims that the sex ratio was driven by some unknown racial specificity of Chinese people have given way to recognition that daughters are being deselected [Scharping, 2003, p.288]. Sex ratios in India are not quite as stark, but show a steadily increasing trend. According to the 2001 census, there were 108 boys per 100 girls in the 0-6 age group, up from 105.8 in the 1991 census.

High and rising sex ratios begs the question what causes parents to select sons. One strand of argument emphasizes socio-economic and institutional factors. Absent ability to save or national pensions, the poor rely heavily on children for old age support, a task that under patriarchal norms falls on sons [Chung and Das Gupta, 2007]. In India, high and rising dowry payments are argued to place families with daughters at a disadvantage, and it has even been argued that families depend on males for physical protection [Oldenburg, 1992].

However, in both India and China, the sex ratios are the highest in the

richest areas, casting doubt on sex choice being the result of economic necessity alone. For instance, Punjab, one of the richest Indian States, had 125 boys per 100 girls in the 0-6 age group according to the 2001 census.

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, a grave affront to Confucian values which emphasize filial piety and ancestral worship. With Communism, Confucianism lost its status as State sanctioned doctrine, but its continued relevance is evident in 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."

For brevity, let us refer to the above two motives as the economic and the cultural, respectively. If the economic motive is the predominant reason parents sex select, then we would expect this practise to fade as India and China continue on their path of economic growth. If, on the other hand, the cultural motive is important, it is less clear why economic development would change son preference or sex choice. The importance of these two factors are hard to disentangle, but by studying Asian immigrants to Canada where the economic motives favoring sons in the host country are arguably not operative, we hope to shed some light on the issue.

Before describing our study, let us make a note on the two principal ways to achieve a son: parents may continue child bearing until a son is born; and parents may sex select. If the selection is postnatal, it also implies continued

child bearing until a son is achieved. Whether pre- or post-natal, the two methods have obviously different implications for number of surviving offspring and their sex ratio. The first method is commonly referred to as a stopping rule, and as such does not imply abnormal sex ratios. The number of observed children is however higher, since daughters are not suppressed.¹ Lower desired fertility, e.g., from higher opportunity cost of mother's time, is one mechanism through which economic development could reduce the attractiveness of this method. Outright sex choice means that sons can be achieved at lower fertility, and prenatal sex determination combined with elective abortion has drastically reduced the physiological cost of this choice.

Whether it also reduces the moral cost may be culture specific. While the high sex ratios in China at birth have drawn attention to prenatal deselection of daughters, the cause is often attributed to the need or desire to bear a son in Chinese society. The possibility that the moral cost of sex selection may also vary across cultures has received far less attention. But whereas the abortion of a female fetus because of her sex may be deemed regrettable but understandable in some societies, it would be judged much more harshly in others, including by those otherwise wedded to abortion on demand.

In this paper we study sex ratios among South-East Asian immigrants to Canada using the 2001 and 2006 censuses. Canadian immigrants 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 "portable" to Canada, to use the terminology of Fernández and Fogli [2009].² Canada is

¹Girls are also more likely to be older sisters, the "birth-order effect" [Basu and de Jong, 2010].

²Conversely, Lhila and Simon [2008] pointed to lack of portability in economic and policy environments as a potential explanation for their finding of gender-*neutral* investments among Asian immigrants to the US following a prenatal ultrasound: "the economic and policy environment in the United States changes parents decision-making problem such that gender-biased investments are no longer optimal" [Lhila and Simon, 2008].

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. Most family heads are admitted based on a point system or through ‘investor’ or ‘entrepreneur’ provisions, further ensuring low rates of poverty among immigrants. 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. Another advantage of the Canadian setting is that there is obviously 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.

We find 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 [Almond and Edlund, 2008, Abrevaya, 2009] and the UK [Dubuc and Coleman, 2007].³ Unlike US Census data, however, we can go further to study assimilation across generations. And there is information on religion, giving us an additional handle on the role of culture. We find higher sex ratios among first generation immigrants who arrived in adulthood. Moreover,

³Dubuc 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.

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 do sex select to achieve sons.

Perhaps our most striking finding concerns (self-declared) religion. Religion is interesting because while no religion condones infanticide (traditionally, the main method of sex selection), Christianity and Islam feature strong prohibitions, whereas others are silent on the topic.⁴ We find high sex ratios to be entirely driven by immigrants who are neither Christian nor 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.

The absence of skewed sex ratios could mirror an absence of sex preference among Christians and Muslims, 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.

Studying immigrants also provides two further insights. First, we contribute to a growing literature that studies the social, fertility, and labor market as-

⁴Judaism also condemns infanticide, but since we are looking at South-East Asia, we have few followers of this religion in our sample.

simulation of immigrants across generations and ages of arrival (for the US, see Bleakley and Chin [2010], Blau et al. [2008], for a comparison between the US and Canada; see Aydemir and Sweetman [2007]).

The remainder of the paper is organized as follows. The "Institutions" section provides some institutional background on immigration to Canada, prenatal sex choice options, abortion access in Canada, and religious prohibitions against sex choice. We then describe the Canadian census microdata and our analysis sample, and our results. We conclude with a brief discussion.

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 Below we provide a brief background of Asian immigration to Canada, prenatal sex determination, and religious and cultural attitudes towards sex selection.

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

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.

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.

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 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).

Prenatal Sex Determination

Prenatal sex determination is actively discouraged in the medical community, but is nonetheless available in Canada. The Society of Obstetricians and Gy-

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>.

naecologists 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.’ 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 the latter two a crime:

for the purpose of creating a human being, [to] perform any procedure 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.

In response to mounting concerns that prenatal sex selection is being prac-

⁹English text available at: <http://laws.justice.gc.ca/en/showdoc/cs/A-13.4/bo-ga:s%5C.5/20090911/en> Interestingly, despite making it illegal, the law’s authors did not consider the practice unethical if geared toward gender-balancing [Dickens et al., 2005].

ticed in the US and Canada, Thiele and Leier [2010] advised Canadian health professionals that “fetal gender need not be [disclosed] in the course of a routine 16 to 20 week ultrasound.”

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 inconsequential.

Cultural Prohibitions Against Sex Selection

While no religion advocates infanticide, Christianity and Islam stand out as proscriptive. 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).¹⁰ Below follows a very brief account.

Abortion and infanticide were permitted under Roman law at the time of Jesus. Since abortion could not be done according to sex of the child, infanticide was the main way to sex select and the selection was predominantly against girls, 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

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

crime was she killed; when the scrolls are laid open; when the 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.”

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. so that the children in the sample all shared the same societal environment (e.g., some were not subject to the one child policy).. 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 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 and East Asia, henceforth South-East Asia.¹⁴ We do so by selecting

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.

¹⁴For a complete list of countries, see Appendix Table 1

all families for which at least one of the grandparents was born in South-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 for our sample and subsamples are provided in Table 1.¹⁵

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.

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

¹⁵Here 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.

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.¹⁶ 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 first is a girl is elevated for 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. For 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 1.05.¹⁷

The Philippines provides a stark counter-example, with sex ratios within the biological norm for all parities — including third children preceded by two girls.¹⁸ 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

¹⁶This 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.’

¹⁷In 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.

¹⁸The slight decline in sex ratio at higher parities is a standard finding [Chahnazarian, 1988].

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 (girl first), and 1.06 for third births (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 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, where previous children were 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, suggesting that less assimilated families sex select more – a point we develop in the regression analysis below.

We next examine the sex ratios of Asian immigrants by generation. Bleakley and Chin [2010] 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 stopping rules to achieve male offspring. Thus, lower desired fertility may prompt more extensive use of sex selection, especially at lower parties.

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.¹⁹ 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. 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

¹⁹Those with one parent arriving before and one after age 18 are grouped with those having both parents arriving before age 18.

Filipino. The middle set of bars displays results for immigrants who are neither Christian nor Muslim. This set of families displays a heightened 1.98 sex ratio for third births with two girls first.²⁰ 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.

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. Clearly, the event “had a another child” depends on the time frame considered, and we settled for a six year window, so that our dependent variable is effectively “had another child within six years.” That is, 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. Similarly, 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

²⁰The 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.

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.²¹ 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.

The first panel of Table 2 contains the results for the sample of families having both parents born in South-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. 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. While seemingly small, translated into sex ratios, these 2.1 percent correspond to a sex ratio of 1.16. The next two columns show third births. Here, we see a large 19.3 percentage point difference in having a

²¹The 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 focal 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.

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.

To 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.

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 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 appear to favor smaller families, but within that constraint, they still prefer sons, resulting in sex selection at second rather than third parity. Finally, Christians and Muslims manifest sex preference through stopping behaviors alone, while both sex selection and stopping behaviors are apparent for other religions.

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 the “Basic regressions” section 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 arrived 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, column 3, the results for having a boy third are quite different. Absence of previous son raise the probability of a boy by 7.2

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.

percentage points.

The middle columns of the panels (columns 2 and 5) interact the family structure variables with the immigrant indicator, allowing first generation immigrants to react 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.

Since stopping rules and sex selection are alternative ways to achieve a child of the desired sex, there may be some substitution between the two methods. That is, 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 split between 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.

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 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 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 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

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.

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.

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 effect on fertility of 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-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.

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.

Discussion

We have documented evidence of a clear son preference among South-East 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 sons over daughters (likely

through abortion) across generations. It is interesting that between the two methods of achieving a son – fertility and sex choice – we see more assimilation along the dimension with less of a cultural divide: fertility. High fertility may be inopportune in a Western society, but does not draw social opprobrium, unlike sex selection which is generally condemned on moral grounds. It could be argued that unlike a preference for 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. This is not to say that the preference for sons is impermeable to cultural influence, including better social and economic status of women. In fact, while we find second generation immigrants to be more likely to sex select already on the second child than first generation immigrants, second generation immigrants were overall less likely to sex select, and within first generation immigrants, son preference appeared stronger among those arriving as adults.

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 an affluent minority in an affluent part of the world, their surplus sons will hardly want for brides.

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 that the lack of sex selection is not because these groups have gender neutral preferences. Interestingly, reluctance

to use the sex choice channel to achieve sons corresponds with religious prescriptions against infanticide in Christianity and Islam, and by extension sex selection, since this was its main employ in Roman Antiquity and pre-Islamic Arabia. While no main religion advocate infanticide, Christianity and Islam stand out by their explicit condemnation. Our finding of course also square with the observation that sex selection is not known to be practised in West Asia, a region dominated by Islam, despite its otherwise male oriented culture.

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, 2003, 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.

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. Primarily because of the destabilizing effect of surplus males, and the implications for population growth of an all male society. Although the disadvantage befalling the least wanted sex when parents have the right to choose might not be manifest in the sex ratio but in who has sons and who has daughters, Edlund [2000] has argued.

Appendix

Table 1: South-East Asian Countries

East Asia	South Asia
China, PRC	Bangladesh
Hong Kong	Bhutan
Japan	India
Korea, South	Maldives
Korea, North	Nepal
Macau	Pakistan
Mongolia	Sri Lanka
Taiwan	
Brunei	
Cambodia	
Indonesia	
Laos	
Malaysia	
Myanmar	
Philippines	
Singapore	
Thailand	
Vietnam	

References

- Jason Abrevaya. Are there missing girls in the United States? Evidence from birth data. *American Economic Journal: Applied Economics*, 1(2):1–34, April 2009.
- Douglas Almond and Lena Edlund. Son biased sex ratios in the U.S. 2000 census. *Proceedings of the National Academy of Sciences*, 105(15):5681–5682, April 15 2008.
- Joshua D. Angrist and William Evans. Children and their parents labor supply: Evidence from exogenous variation in family size. *American Economic Review*, June 1998.
- Abdurrahman Aydemir and Arthur Sweetman. First and second generation immigrant educational attainment and labor market outcomes: A comparison of the United States and Canada. *Research in Labor Economics*, 27:215–270, 2007.
- Judith Banister. *China’s changing population*. Stanford University Press, 1987.
- Deepankar Basu and Robert de Jong. Son targeting fertility behavior: Some consequences and determinants. *Demography*, 47(2):521–536, September 2010.
- Francine D. Blau, Lawrence M. Kahn, Albert Yung-Hsu Liu, and Kerry L. Papps. The transmission of women’s fertility, human capital, and work orientation across immigrant generations. Cornell University, 2008.
- Hoyt Bleakley and Aimee Chin. Age of arrival, English proficiency, and social assimilation among US immigrants. *American Economic Journals: Applied Economics*, 2(1):165–192, 2010.
- A. Chahnazarian. Determinants of the sex ratio at birth: review of recent literature. *Social Biology*, 35:214–235, 1988.
- Woojin Chung. The relation of son preference and religion to induced abortion: The case of South Korea. *Journal of Biosocial Science*, 39:707–719, 2007.
- Woojin Chung and Monica Das Gupta. The decline of son preference in South Korea: The roles of development and public policy. *Population and Development Review*, 33(4):757–783, December 2007.
- AJ Coale and J Banister. Five decades of missing females in China. *Demography*, 31(3):459–479, 1994.
- Gordon Dahl and Enrico Moretti. The demand for sons. *Review of Economic Studies*, 75(4):1085–1120, October 2008.
- Monica Das Gupta. Selective discrimination against female children in rural Punjab, India. *Population and Development Review*, 13:77–100, March 1987.
- Bernard M. Dickens. Prenatal diagnosis and female abortion: a case study in medical law and ethics. *Journal of Medical Ethics*, 12(3):143–144,150, September 1986.

- B.M. Dickens, G.I. Serour, R.J. Cook, and R.-Z. Qiu. Sex selection: Treating different cases differently. *International Journal of Gynecology & Obstetrics*, 90(2):171 – 177, 2005. ISSN 0020-7292. doi: DOI:10.1016/j.ijgo.2005.05.001. URL <http://www.sciencedirect.com/science/article/B6T7M-4GFCR1W-2/2/d6dd8a0adce15c1722926f793d278f87>.
- Sylvie Dubuc and David Coleman. An increase in the sex ratio of births to India-born mothers in England and Wales: Evidence for sex-selective abortion. *Population and Development Review*, 33(2):383–400, June 2007.
- Lena Edlund. The marriage squeeze interpretation of dowry inflation: A comment. *Journal of Political Economy*, 108(6):1327–1333, December 2000.
- Z. Efrat, T. Perri, E. Ramati, D. Tugenreich, and I. Meizner. Fetal gender assignment by first-trimester ultrasound. *Ultrasound Obstetrics and Gynecology*, 27:619–621, 2006.
- Raquel Fernández and Alessandra Fogli. Culture: An empirical investigation of beliefs, work, and fertility. *The American Economic Journal: Macroeconomics*, 1(1):146–177, 2009.
- Aparna Lhila and Kosali I. Simon. Prenatal health investment decisions: Does the child’s sex matter? *Demography*, 45(4):885–905, September 2008.
- Shuzhuo Li. Imbalanced sex ratio at birth and comprehensive intervention in China. Paper presented at the 4th Asia Pacific Conference on Reproductive and Sexual Health and Rights, October 29-31 Hyderabad, India. <http://www.unfpa.org/gender/docs/studies/china.pdf>, 2007.
- Shelly Lundberg and Elaina Rose. The effects of sons and daughters on men’s labor supply and wages. *Review of Economics and Statistics*, 84(2):251–268, 2002.
- Shelly Lundberg and Elaina Rose. Child gender and the transition to marriage. *Demography*, 40(2):333–349, September 2003.
- Barbara D. Miller. *The Endangered Sex: Neglect of Female Children in Rural North India*. Cornell University Press, Ithaca, 1981.
- Philip Oldenburg. Sex ratio, son preference and violence in India: A research note. *Economic and Political Weekly*, (December 5-12):2657–2662, 1992.
- PRC. People’s Republic of China law on population and birth planning. *Population and Development Review*, 28(3):579–585, 2002.
- Thomas Scharping. *Birth Control in China, 1949-2000: Population Policy and Demographic Development*. Routledge, London and New York, 2003.
- Rodney Stark. *The Rise of Christianity: How the Obscure, Marginal Jesus Movement Became the Dominant Religious Force in the Western World in a Few Centuries*. Harper Collins, 1997.
- Allison T. Thiele and Brendan Leier. Towards an ethical policy for the prevention of fetal sex selection in Canada. *Journal of Obstetrics and Gynaecology Canada*, 32(1):54–57, 2010.
- H. Yuan Tien. *Chinas Strategic Demographic Initiative*. Praeger, 1991.

Shripad Tuljapurkar, Nan Li, and Marcus W. Feldman. High sex ratios in China's future. *Science*, 267:874-876, February 1995.

Yi Zeng, Ping Tu, Baochang Gu, Yi Xu, Bohua Li, and Yongping Li. Causes and implications of the recent increase in the reported sex ratio at birth in China. *Population and Development Review*, 19(2):283-302, 1993.

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				
	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.

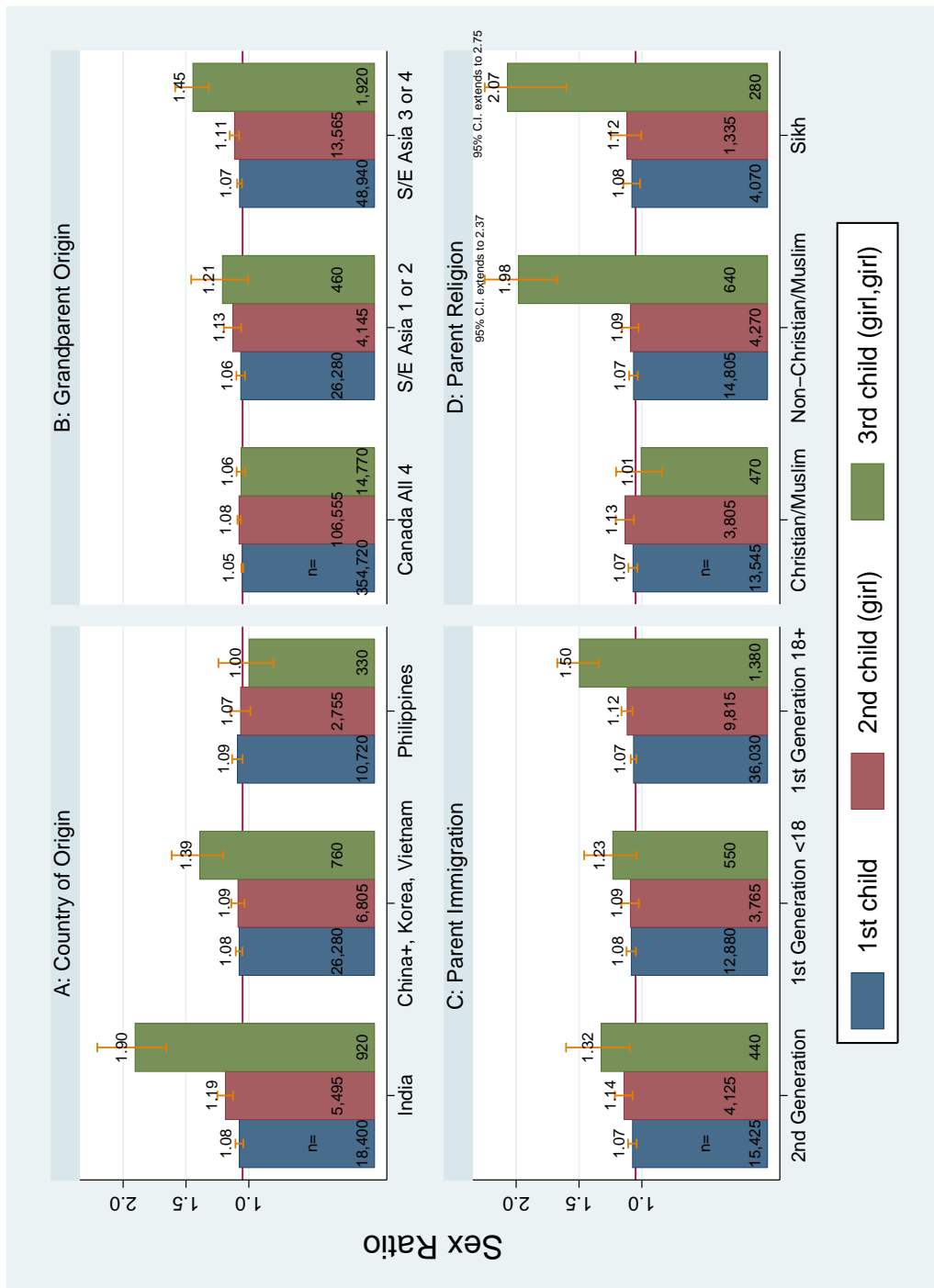


Figure 1: Sex Ratio Among South/East Asian Immigrants to Canada