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Perinatal Health Among 1 Billion American-Born Chinese

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1 Introduction

Son preference is well documented in many Asian counties. Sex selection generates sex ratios (# of males/# of females) above the biologically normal ratio of around 1.05 at birth. For China, Chen, Li, and Meng [2013] argue that availability of prenatal sex determination through ultrasound lead to a 40-50% increase in the sex imbalance during the 1980s. Son preference manifests in sibling sex composition, where the sex ratio of firstborn children is relatively normal but rises at higher birth orders in the absence of a previous son [Yi et al., 1993]. Because official birth certificate and hospital discharge microdata are not publicly available for China, most studies analyze population census data. This tends to focus empirical work on the sex imbalance itself. A key unanswered question is the effect of gender preference on "survivors". An exception is Li and Wu [2011], who use the China Health and Nutrition Survey to show that *mother's* nutrition may deteriorate postpartum upon having a daughter relative to a son.

Son preference among Chinese is not unique to China. Almond and Edlund [2008] document male-biased sex ratios among US-born children of Chinese, Korean, and Asian Indian parents in a 5% sample of 2000 Census. They find male bias is particularly evident for higher parities if there was no previous son. Abrevaya [2009] describes similar findings for Chinese-Americans in (universal) sibling-linked natality data from California. A seminal study by Lhila and Simon [2008] looks beyond sex ratios, but finds no gender bias in prenatal investments using information from birth certificate on reported ultrasound usage among Chinese and Asian-Indians in the US. As Lhila and Simon [2008] acknowledge, reporting an ultrasound procedure is an imperfect indicator for knowing fetal gender: those with high son preference may be more likely to request (and potentially less likely to report) using an ultrasound, making ultrasound reporting endogenous to son preference.

Gender preference aside, perinatal health has a profound impact on population health. The WHO defines the perinatal period as running from 22 weeks gestation to 7 days after birth. Over half of infant deaths occur within first 7 days of life. The death rate for children under age one is more than 13 times higher than the death rate for children age 15 to 19, the group with the next highest rate. Moreover, the fetal origins hypothesis suggests that small gaps in perinatal health can map to large later-life gaps [Barker, 1992, Currie and Hyson, 1999, Almond, Currie, and Duque, 2016]. In the absence of data for China, we explore the perinatal health of American-born Chinese (1.2% of US population).

We expect a biological difference in perinatal health that favors girls (analogous to the fact noted above that we do not expect balanced sex ratios at birth). Kraemer [2000] argues that the male is more fragile during prenatal and neonatal periods. The sex ratio decreases from the initial excess of around 120 male conceptions per female to 105 at birth. Perinatal brain damage, congenital deformities, and stillbirth are also more common in boys. In addition, boys are born developmentally behind girls on average. We ask here whether the advantage in Chinese female health is "big enough" to reflect the expected biological advantage. We adopt a difference-in-difference framework to quantify non-biological gender differences in perinatal outcomes among American-born Chinese. We also compute an implied "discrimination effect" based on a rudimentary framework and our estimated coefficients.

We use mother's race to compare the gender gap in perinatal health among Chinese and White babies born in the US using Vital Statistics micro data and hospital discharge data. Our results indicate that American-born Chinese girls have worse perinatal health than we would expect. Besides sex selective abortion before birth, we also identify more frequent deaths during perinatal period among Chinese girls. In addition, we find Chinese female survivors have lower 5-minute APGAR score, more congenital anomalies, and are more likely to have low birth weight. According to hospital impatient records, Chinese female newborns in California and New York have longer hospital stays, higher neonatal medical costs, and receive more in-hospital treatment procedures. These results suggest differential prenatal investments among Chinese in the U.S. For most perinatal outcomes, we find a larger detriment to female health among less educated Chinese mothers. Incorporating father's race, we we find that son preference captured by perinatal health appears stronger in "double" Chinese families than when the father is non-Chinese and the mother is Chinese.

Turning to alternative explanations, sex selection itself might generate compositional effects which give the appearance of discrimination among "survivors". If, for example, high education parents were particularly likely to sex select and tended to have children with good perinatal health, the absence of such healthy daughters due to sex selection would make female survivors appear worse. To investigate this possibility, we focus on the subsample where the sex ratio is normal: first births. We find very similar patterns and indeed the effect is even larger. This is consistent with our assumption that those Chinese families with baby girls (where sex selection occurs) are on the less extreme end of son preference. Furthermore, we show that sex ratios are highest among parents with less education. Therefore, sex selection by less educated parents would, if anything, lead to an improvement in the health of surviving girls (rendering our overall discrimination estimates conservative). A second alternative explanation is that Chinese are biologically different from Whites in terms of perinatal gender gaps. To address this possibility, we implement our empirical strategy using natality data for 1968-1980 when prenatal care did not routinely provide information on the baby's expected gender. If our results on the Chinese gender gap is due to a biological difference, we expect a similar effect of gender during the "pre" period. However, we find don't find any corresponding detriment to female health among Chinese born 1968-1980.

2 Data

We use the U.S. Vital Statistics micro data from National Center for Health Statistics (NCHS) which consist of three data sets: fetal deaths (1982-2002), linked birth/infant deaths (1983-1991 and 1995-2013[1]), and natality (1968-2013) records. Detailed maternal race and ethnicity categories are reported (i.e. beyond "Asian"), allowing us to investigate gender differences in perinatal health among American-born Chinese.

We also incorporate hospital discharge data from the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) for newborns in California and New York. However, the hospital inpatient data only allow us to identify "Asian" as a group. To address this, we "isolate" Chinese from other Asians based on their residential zip code information in New York HCUP-SID data sets.[2]

2.1 Fetal and Infant Deaths

We include White, Chinese, Japanese, Korean, and Asian Indian mothers in our fetal deaths and infant death extracts. Fetal deaths with gestation length below 20 weeks are dropped due to high rate of missings for fetal sex. We further group infant death according to their timing: on the first day, within first week, and within first month of life.

Table 1 shows the fraction male among perinatal deaths for each maternal race. The faction of male stays above 0.5 and only differs slightly across races, except in the following respect: Column (2) and (3) in Panel A shows that female fetus are more likely to die before live birth among Chinese and Japanese mothers. The Chinese pattern contributes to the high sex ratio among Asian-Americans in Almond and Edlund [2008], Abrevaya [2009]. Column (2) in Panel B further suggests that baby girls with Chinese mothers appear to die

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[1] NCHS did not produce Linked Birth/Infant Death from 1992-1994

[2] California HCUP-SID data do not contain patient zip code

too often even after birth, which would not enter the high sex ratio among Chinese live births [Abrevaya, 2009] but would in analyses of Census data [Almond and Edlund, 2008]. The pattern for Whites suggests that there are biological reasons resulting in gender gap, consistent with the "fragile male" [Kraemer, 2000]. However, there might exist additional gender discriminatory behaviors among Chinese which cause the sex ratio of perinatal deaths to be unusually balanced.

2.2 Natality Records

We combine NCHS natality records from 1968 to 2013 and use linked birth/infant death denominator files wherever available. This data set provides information on maternal demographics, newborn health outcomes, as well as pregnancy and delivery conditions. We construct our analysis sample incorporating all Chinese mothers and for tractability a 10% random sample of White.

Table 3 presents summary statistics in our natality analysis sample. Comparing columns (1)-(2) to columns (4)-(5), Chinese mothers are on average older, more likely to be married, have higher education, and have fewer children. Chinese babies[1] on average have better health conditions, i.e. they are less likely to have low birth weight, congenital anomalies, and ventilator use, as well as having higher APGAR score[2].

Column (3) and (6) indicate gender gaps among White and Chinese births.Girls have better birth outcomes (except birth weight) among Whites. Column (6) suggests that Chinese mothers with baby girls have an attenuated health advantage. Hence, Chinese girls are doing less well than expected.

Assuming gender is exogenous and whatever differences between White boys and girls at birth is biological, we can attribute any additional gender gap among Chinese to discriminatory prenatal investment. However, we note two

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[1] We use mother's race to define race of the newborn throughout this study.

[2] The APGAR score is a measure of the physical condition of a newborn infant, ranging from 0 to 10, based on heart rate, respiratory effort, muscle tone, response to stimulation, and skin coloration.

potential issues in our natality data before we proceed to compare gender gaps among White and Chinese. First, the abnormal sex ratio among Chinese fetal deaths and births (Figure 1) may raise concern about compositional effects among Chinese mothers. However, this issue is basically absent among first births, as indicated by the relatively normal sex ratio. Secondly, the existence of non-zero racial differences makes it ambiguous to use gender gap among White as the appropriate counterfactual gender gap that would occur among Chinese without any gender-responsive parental behavior. We will address this issue in the empirical framework section.

2.3 HCUP State Inpatient Databases

Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) contain all inpatient care records in participating states and encompass more than 95 percent of all U.S. hospital discharges. We choose three states with the highest percentage of Chinese American populations, i.e. California (2003-2009) and New York (1993-2013), and use the diagnosis code to isolate newborns. The SID data provide information on principal and secondary diagnoses and procedures, admission and discharge status, length of stay, total charges, expected payment source, and patient demographics.

Table 4 shows summary statistics in our SID data. Baby girls have lower birth weight, but are less likely to die in the hospital. They also receive fewer medical procedures, incur lower charges, and stay less time in the hospital. Comparing across races, Asian newborns on average receive more medical procedures, incur higher charges, and stay longer in the hospital. Moreover, Asian female babies show less advantage in these aspects which implies they under-perform when comparing to their White counterparts.

Unlike in U.S. Vital Statistics where Chinese is separately coded as a race category, SID only allow us to identify "Asian" in discharge records. Hence, we calculate percent of Chinese among Asian at zip code level in states of New York, then merge such statistics to each hospital inpatient records. 9% Asian newborn records in New York are excluded because of out-of-state zip codes. To refine our sample, we drop Asian babies whose zip code area Chinese to Asian ratio is less than 0.5. In New York, this translates into dropping the lower 47^{th} percentile.

3 Empirical Framework

3.1 Difference-in-Difference Framework

We adopt difference-in-difference (D-in-D) strategy to investigate gender difference in perinatal health among American-born Chinese. The gender gap among Whites is treated as biological and adjusted to derive the gender gap that would occur among Chinese in the absence of differential parental investment.

3.1.1 Baseline D-in-D Model

Consider the standard D-in-D specification:

$$y_i = \gamma + \gamma_c \cdot Chinese_i + \theta \cdot Female_i + \theta_c \cdot Female_i \cdot Chinese_i + \varepsilon_i, \tag{1}$$

where θ denotes gender gap among Whites, γ_c denotes male racial gap between White and Chinese, and θ_c identifies any additional gender difference.

If there is no racial gap in perinatal outcomes, we argue that θ_c identifies the effect from gender-based parental investment among Chinese. However, Table 3 suggests non-zero racial gap γ_c on most of the outcomes. Consider the case on birth weight. The sample summary statistics show that Chinese babies on average are lighter compared to Whites. Therefore, the gender gap among White might be an upward biased proxy for biological difference among Chinese. That is, we cannot directly conclude that the gender gap in birth weight among Chinese ($-101.7g$) is smaller than that among White ($-120.2g$). Hence, we need to adjust gender gaps according to race-specific average level.

3.1.2 Interpreting D-in-D coefficients

Assume

$$\begin{aligned} \theta &= \alpha\gamma, \\ \theta_c &= \alpha\gamma_c + \Theta. \end{aligned}$$

So the race-specific biological gender difference is a scalar α of the race main effect. Θ is effect of prenatal discrimination against girls among Chinese on perinatal outcomes. Then we can calculate:

$$\begin{aligned} \alpha &= \theta/\gamma, && (2) \\ \Theta &= \theta_c - \alpha\gamma_c. && (3) \end{aligned}$$

This shows:

1. Our intuition that when the Chinese race main effect γ_c is zero, we capture the discrimination effect directly with θ_c.
2. Additionally, if the White gender difference in outcomes is zero, we also capture the discrimination effect directly with θ_c (regardless of the race main effect).
3. More importantly, (2) and (3) provide a way to calculate discrimination effect Θ from our d-in-d coefficients when race and (White) gender differences are non-zero, i.e. the usual case.

3.1.3 Normalized D-in-D Model

Alternatively, we develop an equivalent D-in-D specification by normalizing outcome based on race-specific male average, i.e. “normalized D-in-D”.

Equation (1) gives race-gender specific average:

$$\begin{aligned}\bar{y}_{wm} = \gamma, &\qquad \bar{y}_{wf} = \gamma + \theta,\\ \bar{y}_{cm} = \gamma + \gamma_c, &\qquad \bar{y}_{cf} = \gamma + \gamma_c + \theta + \theta_c.\end{aligned}$$

Denote

$$\tilde{y}_{iw} = \frac{y_{iw}}{\bar{y}_{wm}},\ \tilde{y}_{ic} = \frac{y_{ic}}{\bar{y}_{cm}}.$$

Assuming (2) and (3), we derive

$$\begin{aligned}\tilde{y}_{iw} &= 1 + \alpha \cdot Female_{iw} + \tilde{\varepsilon}_{iw},\\ \tilde{y}_{ic} &= 1 + \alpha \cdot Female_{ic} + \frac{\Theta}{\gamma + \gamma_c} \cdot Female_{ic} + \tilde{\varepsilon}_{ic}.\end{aligned}$$

That is

$$\tilde{y}_i = \beta + \beta_c \cdot Chinese_i + \phi \cdot Female_i + \phi_c \cdot Female_i \cdot Chinese_i + \tilde{\varepsilon}_i, \qquad (4)$$

where $\beta = 1$, $\beta_c = 0$, and $\Theta = \phi_c \cdot (\gamma + \gamma_c)$.

3.1.4 D-in-D coefficients in Logit Model

Consider a latent variable framework:

$$Y_i^* = \beta + \beta_c \cdot Chinese_i + \phi \cdot Female_i + \phi_c \cdot Female_i \cdot Chinese_i + \varepsilon_i,$$

where ε_i is the standard logistic error term.

Assume

$$Y_i = \begin{cases} 1, & \text{if } Y_i^* > 0;\\ 0, & \text{if otherwise.}\end{cases}$$

Then we derive a logit model:

$$P(Y_i = 1) = \frac{1}{1 + e^{-(\beta + \beta_c \cdot Chinese_i + \phi \cdot Female_i + \phi_c \cdot Female_i \cdot Chinese_i)}}.$$

That is,

$$odds_{wm} = \frac{P(Y_{wm}=1)}{P(Y_{wm}=0)} = e^{\beta}, \quad odds_{wf} = \frac{P(Y_{wf}=1)}{P(Y_{wf}=0)} = e^{\beta+\phi},$$
$$odds_{cm} = \frac{P(Y_{cm}=1)}{P(Y_{cm}=0)} = e^{\beta+\beta_c}, \quad odds_{cf} = \frac{P(Y_{cf}=1)}{P(Y_{cf}=0)} = e^{\beta+\beta_c+\phi+\phi_c}.$$

Define the race-specific gender difference by the odds ratio [1]:

$$(\frac{odds_f}{odds_m})_w = e^{\phi},\ (\frac{odds_f}{odds_m})_c = e^{\phi+\phi_c}.$$

Any additional gender gap among Chinese is captured by the coefficient ϕ_c.

3.2 Instrumental Variable Framework

Amniocentesis allows parents to know fetal gender at an early pregnancy stage. The amniocentesis adoption rate among Chinese mothers (partially due to high maternal age) is twice the rate among White mothers.[2] We investigate whether the perinatal health gender gap among Chinese differs by amniocentesis adoption.

Denoting Chinese mother individual amniocentesis use (binary) as $Amnio_i$. The following OLS specification identifies the difference in gender gap by amniocentesis status:

$$Y_i = \theta + \theta_a \cdot Amnio_i + \theta_f \cdot Female_i + \gamma \cdot Amnio_i \cdot Female_i + \beta X_i + \varepsilon_i \quad (5)$$

However, the self-reported amniocentesis use in natality data is subject to reporting error and may be endogenous to son preference. Therefore, we use (birth year)×(birth month)×(state)×(county) ×(city) average amniocentesis

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[1] Using odds instead of probability addresses the non-zero racial gap issue because each odd is "normalized" within race-gender level.

[2] We do not pursue the analogous exercise with ultrasound because it is unclear whether ultrasound as reported on the birth certificate reflects sex determination during the second trimester or "obstetric" ultrasound at the time of delivery [Lhila and Simon, 2008].

usage rate among Whites as an instrument for Chinese amniocentesis use.

First stage:

$$Amnio_i = \beta_0 + \beta_1 \cdot \overline{Amnio}_i^W + e_i. \tag{6}$$

Second stage:

$$Y_i = \theta + \theta_a \cdot \widehat{Amnio}_i + \theta_f \cdot Female_i + \gamma \cdot \widehat{Amnio}_i \cdot Female_i + \nu_i. \tag{7}$$

Equation (6) and (7) cannot be directly estimated using IV regression package in statistical software (Stata in our case) because the interaction term $\widehat{Amnio}_i \cdot Female_i$ in second stage would require including interaction term $\overline{Amnio}_i^W \cdot Female_i$ in the first stage. The resulting IV regression becomes:

$$\begin{cases} Amnio_i = \beta_0 + \beta_1 \cdot \overline{Amnio}_i^W + \beta_2 \cdot \overline{Amnio}_i^W \cdot Female_i \\ Amnio_i \cdot Female_i = \rho_0 + \rho_1 \cdot \overline{Amnio}_i^W + \rho_2 \cdot \overline{Amnio}_i^W \cdot Female_i \end{cases} \tag{8}$$

and

$$Y_i = \theta + \theta_u \cdot \widehat{Amnio}_i + \theta_f \cdot Female_i + \gamma \cdot \widehat{Amnio_i \cdot Female_i} + \nu_i \tag{9}$$

Hence, we "manually" generate the 2SLS regression result and compute standard errors using bootstrap method.

4 Results

4.1 Gender Gap on Perinatal Outcome

4.1.1 Main Results

We implement our D-in-D regression strategy using 1985-2013 natality data. Infants born before 1985 are not included because gender of the baby is not commonly known before birth until mid-1980s[1] (Figure 2). The calculated effects Θ from our baseline and normalized regressions are very similar for all outcomes, which suggests a robustness to how we quantify discrimination effect from D-in-D coefficients.

Table 5 shows that Chinese babies on average are doing better than White babies. However, girls are doing less well than boys among Chinese, i.e. have lower APGAR scores and higher probability of congenital anomalies, taking into account their biological differences. Table 6 shows no such pattern on birth weight. However, we observe that Chinese girls are significantly more likely to be (very) low birth weight than Chinese boys after adjusting for "natural" gender gap. In addition, Table 7 shows that Chinese baby girl are facing a higher death rate than expected. This effect is entirely driven by infant death within 1 day, which suggests a lower birth endowment. Although the raw magnitude of the calculated effect Θ is small, most of our outcomes are rare incidents and carry large cost to families and the society. Moreover, comparing Θ to θ, our results show that discrimination effects against female babies among Chinese have a magnitude of $15\% \sim 50\%$ of biological gender differences, or in the extreme even "flip" the gender interaction coefficient's sign.

In addition to focusing on babies' perinatal outcomes, we explore whether son preference adds excess maternal pressure to Chinese mothers. Ideally we would have a measure of cortisol [Aizer et al., 2016]. Since chances of "pregnancy related hypertension" increases with maternal pressure, we compare gender gap in maternal hypertension among White and Chinese. Table 8 provide evidence for our conjecture: Chinese mothers giving birth to female babies have additional risk of pregnancy hypertension. This effect is large enough to reverse the gender gap direction: White mothers with female babies have lower risk of maternal hypertension, but Chinese mothers with baby girls have higher risk. Results on chronic hypertension exhibit no such difference,

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[1] Obstetric ultrasound adoption rate is around 50% in early 1990s.

hence lends credibility to our prenatal gender discrimination story.

4.1.2 Heterogeneity Analysis

We stratify our sample according to maternal education level and babies' birth parity to evaluate heterogeneity in gender discrimination effects on perinatal outcomes.

Table 9 shows that discrimination effect is larger among low education Chinese mothers except for congenital anomalies. Effect on pregnancy hypertension is slightly larger among highly educated Chinese mothers, partly because of higher maternal age[1].

Since the sex ratio among Chinese newborns is above the natural rate, there might be a selection effect that drives our results. We separate babies according to their birth order and compare effects among first children (absent selection effect) and higher parities (subject to selection effect). Table 10 presents our findings. As expected, the effect of son preference is larger among Chinese first births except for the 1-day death rate. If we assume that Chinese parents only sex select at higher parity, those who with the most significant son preference would have chosen not to give birth if the fetus is a girl. Hence, they do not enter our sample of higher birth parities. Our regression results for the 1-day death rate further suggest such a hypothesis: Chinese girls have lower chance to survive than biologically predicted after (and before) birth at higher parity.

We also study babies born to two Chinese parents separately. Table 11 suggests gender discrimination effects on perinatal outcomes are more significant among two Chinese parents. However, effects on infant death rate and pregnancy hypertension are not very different.

4.1.3 Robustness Checks

In order for Chinese parents to behave differently based on gender before birth, knowing fetal sex is essential. Therefore, we conduct a falsification

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[1] Risk of pregnancy hypertension is positively correlated with maternal age.

check and expect zero effect using observations before ultrasound technology is widely available in prenatal care. Table 12 shows results on pre-ultrasound period (1968-1980). None of the coefficient is significantly different from zero. Although our pre-ultrasound estimates are less precise due to smaller sample size, the point estimates take extremely small values or carry the opposite signs compared to our post-ultrasound estimates.

Although we believe gender is assigned fairly exogenously to births, some maternal characteristics, such as age [Norberg, 2004, Almond and Edlund, 2007], might slightly affect the odds of baby's gender through biological channels. Therefore, we repeat our D-in-D regression with different sets of covariate variables to test our assumption. Table 13 summarizes the results. Comparing across columns, the point estimates from both baseline and normalized regressions stay very stable when we add different sets of covariates. We take this as supporting evidence to validate our empirical strategy and results.

4.2 Gender Gap on Hospital Cost

We use California and New York hospital discharge data to investigate how compromised newborn health translates into the intensity of clinical care and costs. In particular, we look at gender gaps in length of hospital stay, total hospital charges, and number of medical procedures. Since the distribution of these three outcomes are right skewed due to extremely large cost on those rare but severe cases, we log these outcomes in our regressions. As mentioned earlier in the paper, the State Inpatient Database do not record detailed Asian race categories. Therefore, we only estimate the effect on "Asian" newborns.

Table 14 shows regression estimates on length of hospital stay. In both California and New York, girls stay remain in the hospital for a shorter period after birth. However, Asian female babies have smaller advantage compared to their White counterparts. Table 15 presents results on total hospital charges. The cost advantage for Asian female babies is only 60% $\sim$ 70% of that for Whites. Not surprisingly, very similar patterns exist for the number of medical procedures, demonstrated in Table 16. In addition, we observe that point estimate tend to change after controlling for payment plan (insurance type). This suggests there exists heterogeneity in insurance type among Chinese and White babies.

Based on the above evidence, although not highly likely, we cannot rule out the possibility that such effects among Asian female babies are not driven by Chinese. Therefore, we repeat the analysis, but only include Asian newborns living in zip code areas with Chinese being the dominant race among Asian (referred as "Chinese"). Comparing effects on Asian and "Chinese" in Table 17, we find regression estimates on all three outcomes increase in magnitude and significance. This implies that the gender discrimination effects among Asian are most likely driven by Chinese rather than other Asian races.[1]

4.3 IV Regression Results

To probe our hypothesis that American-born Chinese female babies have worse perinatal health due to prenatal discrimination, we adopt two stage least square (2SLS) regression to compare Chinese mothers with and without amniocentesis during pregnancy using U.S. natality data. To address the endogeneity issue mentioned in IV framework section, we use time×location average amniocentesis usage rate among Whites as instrument. Thus, we exploit variation in Chinese use of our amniocentesis as driven by it's availability for presumably non-sex selection purposes.

If amniocentesis is adopted solely based on medical needs, we expect no difference in gender gap after controlling for certain maternal characteristics such as age and education level. To control for time varying trend in amniocentesis adoption (which might potentially be correlated with other drivers of gender gaps), we include year fixed effects. In addition, we control for amniocentesis availability using the total number of White births in one's residential

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[1] Chinese and White babies do have different insurance plans, nor does there appear to be an interaction effect with gender, i.e. the coefficient on interaction term is not significant.

area as a proxy for population size.

Table 18 shows results based on D-in-D (OLS) regression. We do not see any evidence indicating that Chinese girls perform more poorly at birth if her mother had amniocentesis. However, the coefficient on the interaction term is subject to endogeneity issue.

Table 19 presents results based on 2SLS regression. Panel A shows our first stage. Coefficients on the instrumental variable suggest a strong effect of availability on Chinese use: a 1% increase in amniocentesis use among Whites raises the probability of usage among Chinese in the same area increases by more than 0.5%. Panel B shows results from second stage. Unlike in previous D-in-D regression, we find significant effects on birth weight, pregnancy hypertension, and suggestive evidence on congenital anomalies. Chinese girls whose mother have amniocentesis on average have larger negative gender gap on birth weight comparing to those without amniocentesis. They show a greater tendency to have low birth weight as well. Moreover, Chinese mother who adopt amniocentesis shows greater risk of having pregnancy related hypertension when the baby is a girl. However, there is no such gender difference among Chinese mothers not adopting amniocentesis. Although we do not get significant effects on the interaction term when considering congenital anomalies, the point estimate suggests that Chinese female birth is less likely to have congenital anomalies among mothers not taking amniocentesis. But such gender gap is reversed, i.e. female birth has higher risk of congenital anomalies, if the mother choose to take amniocentesis for “availability” reasons.

5 Conclusion

Almond and Edlund [2008] analyzed the 2000 US population Census and interpreted the “found deviation in favor of sons to be evidence of sex selection, most likely at the prenatal stage.” To our surprise, we find here that *some* of the deviation in Chinese-American sex ratios comes from excess perinatal mortality among girls. Excess neonatal mortality in principle could come from differential neglect postnatally. This mechanism seems unlikely to us for several reasons. First, excess neonatal mortality is driven by girl deaths very soon after birth when the child is likely still in the hospital. Second, we see from medical treatments that Chinese girls are *more* aggressively treated after birth than we'd expect from the biological gender difference. Such aggressive treatment is consistent with hospitals responding to girls being in worse health at birth. Health outcomes recorded very close to birth, such as low birth weight and APGAR score, indicate that Chinese girls are in worse health than expected (prior to much postnatal care). Furthermore, we find excess congenital anomalies and stillbiths among Chinese girls, which by definition are not responsive to postnatal medical treatment. This pattern of outcomes suggests differential prenatal environments experienced by Chinese girls. Indeed, pregnancy-associated hypertension is markedly higher when a Chinese mother is pregnant with a girl. Furthermore, we do not detect the same gender differences in health before the period of prenatal ultrasound diffusion in the US.

In addition to suggesting an additional (non-abortion) mechanism for elevated sex ratios, our findings suggest that perinatal gender bias is not confined to sex ratios. Surviving Chinese girls also suffer worse health. After prenatal sex determination, son preference can now be expressed (perhaps unconsciously) during the prenatal period in ways that harm female health. This harm is shrouded, to some extent, by the "fragile male" [Kraemer, 2000]. For certain outcomes like pregnancy-induced hypertension and fetal death (still birth), Chinese girls fare worse in absolute terms than Chinese boys.

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Figure 1: Sex Ratio among Live Births in the United States

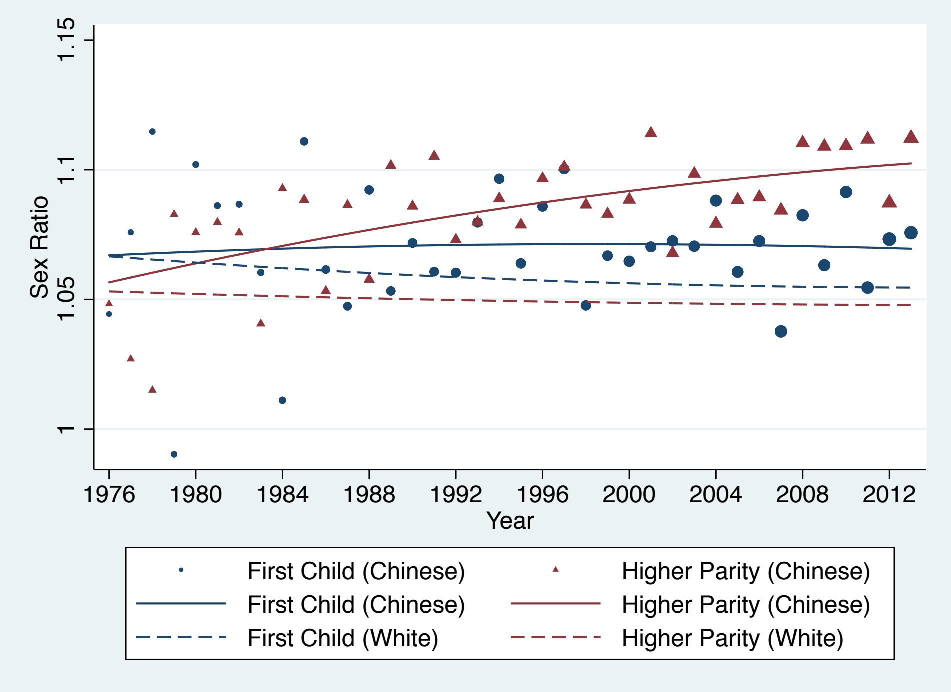

Figure 2: Prenatal Ultrasound Usage: Knowing Baby's Sex

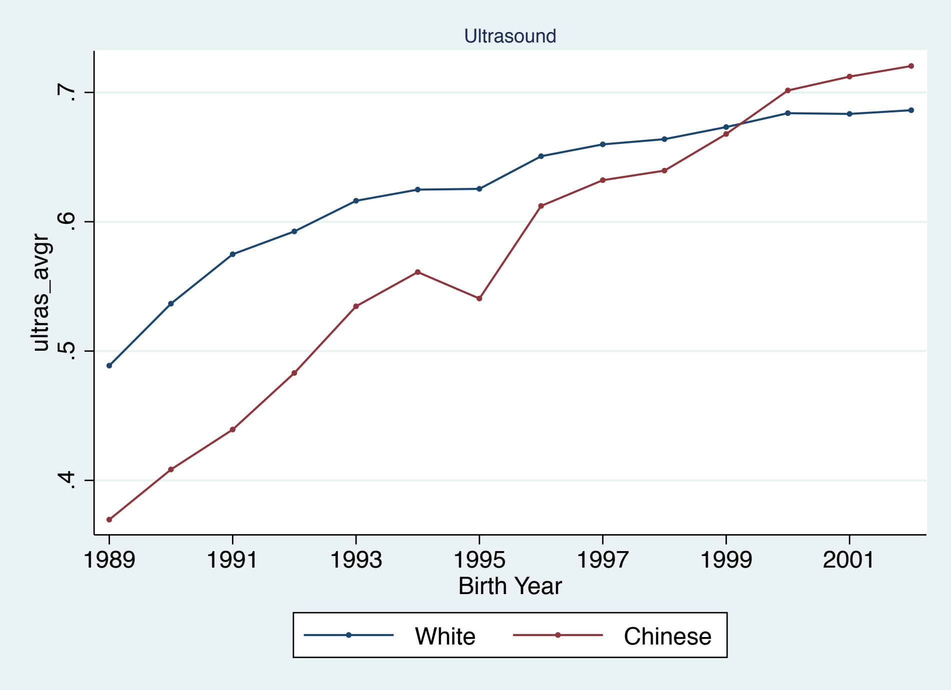

Table 1: Sex Ratio among Perinatal Deaths

	White	Chinese	Japanese	Korean	Asian Indian
Panel A: Fetal deaths after 20 gestation weeks					
Fraction of Male	0.52606	0.49867	0.49901	0.51208	0.53684
	(0.00075)	(0.01052)	(0.01574)	(0.02460)	(0.01206)
Observations	445,582	2,260	1,010	414	1,710
Panel B: Infant deaths within 1 month					
Fraction of Male	0.56213	0.53218	0.55580	0.56684	0.57238
	(0.00081)	(0.01037)	(0.01644)	(0.02040)	(0.01009)
Observations	377,022	2,315	914	591	2,404

Standard errors in parentheses

Data source: U.S Vital Statistics micro data.

Table 2: Regression Coefficients on Chinese Mothers[1]

Death Case	Fraction of Male			Chinese
Fetal $\geq$ 20 Weeks	-0.0274***	-0.0286***	-0.0374***	2260
	(0.0105)	(0.0105)	(0.0111)	
Infant $\leq$ 1 Day	-0.0471***	-0.0502***	-0.0644***	1238
	(0.0142)	(0.0146)	(0.0162)	
Infant $\leq$ 1 Week	-0.0352***	-0.0381***	-0.0459***	1851
	(0.0116)	(0.0119)	(0.0130)	
Infant $\leq$ 1 Month	-0.0299***	-0.0324***	-0.0416***	2315
	(0.0103)	(0.0106)	(0.0116)	
Year FE	*No*	*Yes*	*Yes*	
Gestation FE	*No*	*Yes*	*Yes*	
Birth order FE	*No*	*No*	*Yes*	

$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$ Standard errors in parentheses

Data source: U.S Vital Statistics micro data.

[1] White mothers as control group.

Table 3: Summary Statistics in Natality Data

	White			Chinese		
	Male	Female	Female−Male	Male	Female	Female−Male
Panel A: Maternal Characteristics						
Birth Parity	1.973	1.976	0.00535***	1.656	1.648	-0.0110***
			(0.000680)			(0.00163)
Multiple Births	0.0273	0.0284	0.00110***	0.0204	0.0219	0.000435
			(0.0000913)			(0.000308)
Chronic Hypertension	0.00683	0.00672	-0.000180***	0.00403	0.00308	-0.000126
			(0.0000635)			(0.000128)
Pregnancy Hypertension	0.0376	0.0360	-0.00152***	0.0122	0.0138	0.000446*
			(0.000136)			(0.000245)
Panel B: Obstetric and Delivery Procedures						
Amniocentesis	0.0314	0.0319	0.000353**	0.0671	0.0692	0.000920
			(0.000167)			(0.000768)
Ultrasound	0.677	0.677	-0.000694	0.624	0.623	-0.000688
			(0.000466)			(0.00160)
C-Section	0.228	0.212	-0.0115***	0.206	0.185	-0.0112***
			(0.000262)			(0.000727)
Panel C: Newborn Outcomes						
APGAR Score	8.941	8.965	0.0252***	8.959	8.976	0.0135***
			(0.000535)			(0.00151)
Birth Weight	3435.6	3315.5	-120.2***	3353.5	3249.6	-101.7***
			(0.327)			(0.991)
Low Birth Weight ($\leq 2500g$)	0.0575	0.0669	0.00942***	0.0455	0.0545	0.00905***
			(0.000137)			(0.000450)
Very Low Birth Weight ($\leq 1500g$)	0.0103	0.0103	-0.0000999*	0.00633	0.00684	0.000204
			(0.0000573)			(0.000165)
Congenital Anomalies	0.0132	0.00910	-0.00272***	0.0130	0.0112	-0.000973***
			(0.0000570)			(0.000145)
Ventilator Use	0.0312	0.0272	-0.00414***	0.0241	0.0215	-0.00158***
			(0.000140)			(0.000335)
Observations	6481568	6155869	12637437	532446	493391	1025837

$*** \; p < 0.01$, $** \; p < 0.05$, $* \; p < 0.1$ Standard errors in parentheses

Data source: U.S Vital Statistics micro data.

Table 4: Summary Statistics in HCUP State Inpatient Data

	White			Asian		
	Male	Female	Female−Male	Male	Female	Female−Male
Panel A: New York						
Total Charges (log)	8.437	8.315	-0.107***	8.638	8.567	-0.0632***
			(0.00153)			(0.00380)
Length of Stay (log)	0.927	0.893	-0.0355***	0.961	0.929	-0.0298***
			(0.000849)			(0.00208)
Number of Procedures	1.821	1.120	-0.723***	2.202	1.710	-0.457***
			(0.00203)			(0.00571)
Birth Weight	3401.7	3271.7	-125.0***	3255.2	3156.8	-97.52***
			(0.863)			(2.123)
Low Birth Weight	0.0589	0.0720	0.0117***	0.0628	0.0737	0.00962***
			(0.000367)			(0.00102)
Very Low Birth Weight	0.00858	0.00948	0.000491***	0.00690	0.00679	0.0000647
			(0.000152)			(0.000365)
Died in Hospital	0.00114	0.000979	-0.000429***	0.000927	0.000927	-0.000172
			(0.0000741)			(0.000177)
Observations	944024	893072	1837096	123466	114587	238053
Panel B: California						
Total Charges (log)	8.426	8.325	-0.101***	8.581	8.514	-0.0736***
			(0.00205)			(0.00357)
Length of Stay (log)	0.796	0.754	-0.0439***	0.873	0.844	-0.0341***
			(0.00125)			(0.00212)
Number of Procedures	0.881	0.526	-0.406***	1.021	0.727	-0.326***
			(0.00238)			(0.00450)
Died in Hospital	0.00105	0.000718	-0.000525***	0.000736	0.00108	-0.000131
			(0.0000926)			(0.000157)
Observations	606652	580554	1187206	185663	175165	360828

$*** \ p < 0.01$, $** \ p < 0.05$, $* \ p < 0.1$ Standard errors in parentheses

Data source: HCUP State Inpatient Databases.

Table 5: Gender Gap on Perinatal Outcomes

	APGAR Score		Congenital Anomalies			Ventilator Use		
	Baseline	Normalized	Baseline	Normalized	Logit	Baseline	Normalized	Logit
γ	8.904***	1.000***	0.00922***	1.000***	-4.677***	0.0286***	1.000***	-3.524***
	(0.000383)	(0.0000430)	(0.0000410)	(0.00474)	(0.00492)	(0.0000803)	(0.00298)	(0.00304)
γ_c	0.0497***	-6.42e-08	-0.00432***	1.10e-11	-0.636***	-0.0134***	4.15e-08	-0.642***
	(0.00136)	(0.000152)	(0.000136)	(0.0157)	(0.0218)	(0.000263)	(0.00979)	(0.0133)
θ	0.0246***	0.00276***	-0.00254***	-0.275***	-0.324***	-0.00349***	-0.122***	-0.134***
	(0.000549)	(0.0000617)	(0.0000588)	(0.00679)	(0.00769)	(0.000115)	(0.00427)	(0.00450)
θ_c	-0.0124***	-0.00140***	0.00181***	0.126***	0.163***	0.00216***	0.0345**	0.0408**
	(0.00196)	(0.000220)	(0.000195)	(0.0226)	(0.0328)	(0.000380)	(0.0141)	(0.0196)
Θ	-0.0125***	-0.01254	0.000620***	0.00062		0.000527	0.00052	
	(0.00196)		(0.000166)			(0.000346)		
N	8146709	8146709	9704295	9704295	9704295	8370794	8370794	8370794

$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$ Standard errors in parentheses

Data source: U.S Vital Statistics micro data.

Table 6: Gender Gap on Birth Weight

	Birth Weight		Low Birth Weight ($\leq 2500g$)			Very Low Birth Weight ($\leq 1500g$)		
	Baseline	Normalized	Baseline	Normalized	Logit	Baseline	Normalized	Logit
γ	3411.1***	1.000***	0.0604***	1.000***	-2.745***	0.0110***	1.000***	-4.503***
	(0.266)	(0.0000781)	(0.000113)	(0.00190)	(0.00194)	(0.0000472)	(0.00451)	(0.00445)
γ_c	-93.22***	3.28e-08	-0.00994***	7.77e-08	-0.190***	-0.00410***	4.35e-09	-0.473***
	(0.874)	(0.000257)	(0.000372)	(0.00626)	(0.00690)	(0.000155)	(0.0148)	(0.0181)
θ	-117.0***	-0.0343***	0.00893***	0.148***	0.147***	-0.000164**	-0.0150**	-0.0153**
	(0.381)	(0.000112)	(0.000162)	(0.00273)	(0.00269)	(0.0000676)	(0.00646)	(0.00639)
θ_c	14.72***	0.00347***	0.000363	0.0363***	0.0315***	0.000466**	0.0590***	0.0587**
	(1.260)	(0.000370)	(0.000536)	(0.00902)	(0.00956)	(0.000224)	(0.0214)	(0.0259)
Θ	11.52***	11.51304	0.00183***	0.00183		0.000404*	0.00041	
	(1.237)		(0.000567)			(0.000216)		
N	10029894	10029894	10029894	10029894	10029894	10029894	10029894	10029894

$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$ Standard errors in parentheses

Data source: U.S Vital Statistics micro data.

Table 7: Gender Gap on Infant Death Rate

	Infant Death (1 - 24 Hours)			Infant Death (2 - 7 Days)		
	Baseline	Normalized	Logit	Baseline	Normalized	Logit
γ	0.00122***	1.000***	-6.705***	0.000743***	1.000***	-7.204***
	(0.0000171)	(0.0150)	(0.0148)	(0.0000132)	(0.0185)	(0.0190)
γ_c	-0.000611***	-6.38e-08	-0.693***	-0.000254***	1.20e-08	-0.418***
	(0.0000575)	(0.0505)	(0.0691)	(0.0000446)	(0.0622)	(0.0778)
θ	-0.000193***	-0.158***	-0.172***	-0.000145***	-0.195***	-0.217***
	(0.0000244)	(0.0215)	(0.0222)	(0.0000189)	(0.0265)	(0.0289)
θ_c	0.000251***	0.253***	0.263***	0.0000398	-0.0196	-0.0245
	(0.0000829)	(0.0728)	(0.0976)	(0.0000643)	(0.0897)	(0.120)
Θ	0.000155**	0.000154		-0.00000958	-0.000010	
	(0.0000743)			(0.0000571)		
N	7958665	7958665	7958665	7958665	7958665	7958665

$*** \ p < 0.01$, $** \ p < 0.05$, $* \ p < 0.1$ Standard errors in parentheses

Data source: U.S Vital Statistics micro data.

Table 8: Gender Gap on Maternal Pressure

	Maternal Pregnancy Hypertension			Maternal Chronic Hypertension		
	Baseline	Normalized	Logit	Baseline	Normalized	Logit
γ	0.0380***	1.000***	-3.231***	0.00800***	1.000***	-4.820***
	(0.0000918)	(0.00275)	(0.00262)	(0.0000431)	(0.00588)	(0.00562)
γ_c	-0.0255***	7.92e-08	-1.135***	-0.00449***	-2.07e-08	-0.827***
	(0.000292)	(0.00877)	(0.0139)	(0.000137)	(0.0187)	(0.0262)
θ	-0.00152***	-0.0400***	-0.0424***	-0.000180***	-0.0225***	-0.0230***
	(0.000131)	(0.00394)	(0.00379)	(0.0000618)	(0.00842)	(0.00810)
θ_c	0.00197***	0.0756***	0.0778***	0.0000545	-0.0133	-0.0136
	(0.000422)	(0.0126)	(0.0198)	(0.000198)	(0.0270)	(0.0381)
Θ	0.000948**	0.00095		-0.0000466	-0.00005	
	(0.000395)			(0.000188)		
N	8620305	8620305	8620305	8620305	8620305	8620305

$*** \ p < 0.01$, $** \ p < 0.05$, $* \ p < 0.1$ Standard errors in parentheses

Data source: U.S Vital Statistics micro data.

Table 9: High vs. Low Maternal Education

	High Maternal Education			Low Maternal Education		
	Baseline	Calculated Θ	N	Baseline	Calculated Θ	N
APGAR Score	-0.0101***	-0.0102***	7810122	-0.0138***	-0.0140***	7702861
	(0.00280)	(0.00280)		(0.00346)	(0.00346)	
Low Birth Weight	-0.0000860	0.00141*	9553001	0.000472	0.00210**	9368702
	(0.000757)	(0.000807)		(0.000984)	(0.00105)	
Very Low Birth Weight	0.000263	0.000196	9553001	0.000610	0.000550	9368702
	(0.000317)	(0.000310)		(0.000414)	(0.000407)	
Congenital Anonalies	0.00179***	0.000602**	9253230	0.00177***	0.000562*	9059237
	(0.000276)	(0.000239)		(0.000372)	(0.000324)	
Ventilator Use	0.00173***	0.000559	7998678	0.00220***	0.000620	7796829
	(0.000524)	(0.000487)		(0.000741)	(0.000693)	
Infant Death (1-Day)	0.000160	0.0000588	7223864	0.000406***	0.000312**	7071024
	(0.000107)	(0.0000971)		(0.000136)	(0.000125)	
Pregancy Hypertension	0.00202***	0.00104**	8289670	0.00192***	0.000838	8059407
	(0.000528)	(0.000503)		(0.000697)	(0.000672)	

$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$ Standard errors in parentheses

Data source: U.S Vital Statistics micro data.

Table 10: First Child vs. Higher Parity

	First Child			Higher Parity		
	Baseline	Calculated Θ	N	Baseline	Calculated Θ	N
APGAR Score	-0.0140***	-0.0142***	3392344	-0.0124***	-0.0125***	4718095
	(0.00292)	(0.00293)		(0.00266)	(0.00266)	
Low Birth Weight	0.00187**	0.00349***	4153562	-0.000673	0.000563	5831273
	(0.000788)	(0.000812)		(0.000739)	(0.000798)	
Very Low Birth Weight	0.000893***	0.000591*	4153562	0.000142	0.000176	5831273
	(0.000334)	(0.000313)		(0.000303)	(0.000300)	
Congenital Anonalies	0.00189***	0.000649***	4016865	0.00172***	0.000561**	5651433
	(0.000283)	(0.000239)		(0.000273)	(0.000233)	
Ventilator Use	0.00230***	0.000444	3448353	0.00219***	0.000630	4891463
	(0.000571)	(0.000516)		(0.000515)	(0.000472)	
Infant Death (1-Day)	0.000148	0.0000456	2549310	0.000461***	0.000379***	3568921
	(0.000138)	(0.000123)		(0.000133)	(0.000121)	
Pregancy Hypertension	0.00362***	0.00162*	2393759	0.000963	0.000520	3382983
	(0.000904)	(0.000838)		(0.000631)	(0.000602)	

$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$ Standard errors in parentheses

Data source: U.S Vital Statistics micro data.

Table 11: Chinese Mothers vs. Double Chinese Parents

	Chinese			Double Chinese		
	Baseline	Calculated Θ	N	Baseline	Calculated Θ	N
APGAR Score	-0.0124***	-0.0125***	8146709	-0.0149***	-0.0150***	7984255
	(0.00196)	(0.00196)		(0.00225)	(0.00225)	
Low Birth Weight	0.000363	0.00183***	10029894	0.000312	0.00221***	9807821
	(0.000536)	(0.000567)		(0.000609)	(0.000645)	
Very Low Birth Weight	0.000466**	0.000404*	10029894	0.000547**	0.000473*	9807821
	(0.000224)	(0.000216)		(0.000254)	(0.000246)	
Congenital Anonalies	0.00181***	0.000620***	9704295	0.00199***	0.000744***	9487994
	(0.000195)	(0.000166)		(0.000224)	(0.000191)	
Ventilator Use	0.00216***	0.000527	8370794	0.00259***	0.000758*	8173229
	(0.000380)	(0.000346)		(0.000437)	(0.000401)	
Infant Death (1-Day)	0.000251***	0.000155**	7958665	0.000221**	0.000110	7792184
	(0.0000829)	(0.0000743)		(0.0000942)	(0.0000850)	
Pregancy Hypertension	0.00197***	0.000948**	8620305	0.00188***	0.000777*	8412621
	(0.000422)	(0.000395)		(0.000483)	(0.000457)	

$* * * \ p < 0.01$, $** \ p < 0.05$, $* \ p < 0.1$ Standard errors in parentheses

Data source: U.S Vital Statistics micro data.

Table 12: Pre-ultrasound vs. Post-ultrasound

	Pre-ultrasound			Post-ultrasound		
	Baseline	Calculated Θ	N	Baseline	Calculated Θ	N
APGAR Score	-0.00516	-0.00572	561694	-0.0124***	-0.0125***	8146709
	(0.0153)	(0.0153)		(0.00196)	(0.00196)	
Low Birth Weight	-0.00166	-0.000567	2491899	0.000363	0.00183***	10029894
	(0.00191)	(0.00208)		(0.000536)	(0.000567)	
Very Low Birth Weight	0.000155	0.0000335	2491899	0.000466**	0.000404*	10029894
	(0.000752)	(0.000730)		(0.000224)	(0.000216)	
Congenital Anonalies	0.00102	-0.000139	276088	0.00181***	0.000620***	9704295
	(0.00207)	(0.00181)		(0.000195)	(0.000166)	

$* * * \ p < 0.01$, $** \ p < 0.05$, $* \ p < 0.1$ Standard errors in parentheses

Data source: U.S Vital Statistics micro data.

Table 13: Results With and Without Covariates

	No Fixed Effect		Year Fixed Effects		All Fixed Effects[1]	
	Baseline	Normalized	Baseline	Normalized	Baseline	Normalized
APGAR Score	-0.0119***	-0.00135***	-0.0123***	-0.00139***	-0.0120***	-0.00135***
	(0.00224)	(0.000251)	(0.00223)	(0.000250)	(0.00222)	(0.000250)
Low Birth Weight	0.000227	0.0325***	0.000238	0.0327***	0.000340	0.0353***
	(0.000610)	(0.0105)	(0.000610)	(0.0105)	(0.000609)	(0.0102)
Very Low Birth Weight	0.000431*	0.0531**	0.000431*	0.0531**	0.000444*	0.0529**
	(0.000253)	(0.0248)	(0.000253)	(0.0248)	(0.000253)	(0.0241)
Congenital Anomalies	0.00187***	0.121***	0.00186***	0.120***	0.00186***	0.128***
	(0.000228)	(0.0257)	(0.000228)	(0.0256)	(0.000228)	(0.0262)

$* * * \ p < 0.01$, $** \ p < 0.05$, $* \ p < 0.1$ Standard errors in parentheses

Data source: U.S Vital Statistics micro data.

[1] Covariates include maternal age, maternal education, infant's birth order.

Table 14: Length of Stay (log)

	California			New York		
γ	0.769***	0.751***	0.821***	0.921***	0.901***	0.812***
	(0.000861)	(0.00154)	(0.0302)	(0.000585)	(0.00158)	(0.00702)
γ_a	0.0481***	0.0473***	0.0527***	0.0169***	0.0140***	0.0290***
	(0.00177)	(0.00177)	(0.00177)	(0.00172)	(0.00172)	(0.00173)
θ	-0.0439***	-0.0439***	-0.0436***	-0.0355***	-0.0355***	-0.0353***
	(0.00123)	(0.00123)	(0.00123)	(0.000838)	(0.000838)	(0.000837)
θ_a	0.00975***	0.00976***	0.00849***	0.00569**	0.00568**	0.00535**
	(0.00254)	(0.00254)	(0.00254)	(0.00247)	(0.00247)	(0.00247)
Θ	0.0125***	0.0125***	0.0113***	0.00634***	0.00623**	0.00661***
	(0.00251)	(0.00251)	(0.00251)	(0.00243)	(0.00243)	(0.00243)
N	1521483	1521483	1521305	2060162	2060162	2060162
Year FE	No	Yes	Yes	No	Yes	Yes
Payment FE	No	No	Yes	No	No	Yes

$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$ Standard errors in parentheses

Data source: HCUP State Inpatient Database.

Table 15: Total Hospital Charges (log)

	California			New York		
γ	8.174***	7.949***	7.941***	7.941***	7.345***	7.121***
	(0.00141)	(0.00251)	(0.0497)	(0.00105)	(0.00262)	(0.0116)
γ_a	0.123***	0.110***	0.118***	0.296***	0.198***	0.254***
	(0.00299)	(0.00295)	(0.00295)	(0.00310)	(0.00286)	(0.00287)
θ	-0.101***	-0.100***	-0.0999***	-0.107***	-0.107***	-0.107***
	(0.00202)	(0.00199)	(0.00199)	(0.00151)	(0.00139)	(0.00138)
θ_a	0.0271***	0.0278***	0.0254***	0.0441***	0.0426***	0.0414***
	(0.00428)	(0.00423)	(0.00422)	(0.00446)	(0.00411)	(0.00408)
Θ	0.0286***	0.0292***	0.0269***	0.0481***	0.0455***	0.0452***
	(0.00427)	(0.00421)	(0.00421)	(0.00445)	(0.00410)	(0.00407)
N	1337434	1337434	1337259	2074690	2074690	2074690
Year FE	No	Yes	Yes	No	Yes	Yes
Payment FE	No	No	Yes	No	No	Yes

$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$ Standard errors in parentheses

Data source: HCUP State Inpatient Database.

Table 16: Number of Medical Procedures (log)

	California			New York		
γ	0.478***	0.400***	0.348***	0.772***	0.574***	0.669***
	(0.000631)	(0.00112)	(0.0219)	(0.000503)	(0.00128)	(0.00573)
γ_a	0.0366***	0.0311***	0.0278***	0.119***	0.0799***	0.0636***
	(0.00130)	(0.00129)	(0.00129)	(0.00148)	(0.00140)	(0.00141)
θ	-0.224***	-0.224***	-0.224***	-0.392***	-0.392***	-0.392***
	(0.000903)	(0.000896)	(0.000888)	(0.000722)	(0.000683)	(0.000682)
θ_a	0.0597***	0.0600***	0.0590***	0.193***	0.192***	0.193***
	(0.00187)	(0.00186)	(0.00184)	(0.00213)	(0.00202)	(0.00201)
Θ	0.0769***	0.0775***	0.0769***	0.253***	0.247***	0.230***
	(0.00154)	(0.00147)	(0.00181)	(0.00173)	(0.00155)	(0.00161)
N	1548034	1548034	1547846	2075149	2075149	2075149
Year FE	No	Yes	Yes	No	Yes	Yes
Payment FE	No	No	Yes	No	No	Yes

$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$ Standard errors in parentheses

Data source: HCUP State Inpatient Database.

Table 17: Asian vs. "Chinese" in New York[1]

	Length of Stay (log)		Hospital Charges (log)		Medical Procedures (log)	
	Asian	"Chinese"	Asian	"Chinese"	Asian	"Chinese"
γ	0.812***	0.811***	7.121***	7.122***	0.669***	0.673***
	(0.00702)	(0.00710)	(0.0116)	(0.0117)	(0.00573)	(0.00574)
$\gamma_{a/c}$	0.0290***	-0.00523**	0.254***	0.251***	0.0636***	0.0896***
	(0.00173)	(0.00242)	(0.00287)	(0.00401)	(0.00141)	(0.00196)
θ	-0.0353***	-0.0353***	-0.107***	-0.107***	-0.392***	-0.392***
	(0.000837)	(0.000839)	(0.00138)	(0.00138)	(0.000682)	(0.000678)
$\theta_{a/c}$	0.00535**	0.0124***	0.0414***	0.0572***	0.193***	0.245***
	(0.00247)	(0.00345)	(0.00408)	(0.00551)	(0.00201)	(0.00280)
Θ	0.00661***	0.0121***	0.0452***	0.0610***	0.230***	0.297***
	(0.00243)	(0.00338)	(0.00407)	(0.00568)	(0.00161)	(0.00224)
N	2060162	1937401	2074690	1951476	2075149	1951924

$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$ Standard errors in parentheses

Data source: HCUP State Inpatient Database.

[1] Year FE and Payment (insurance type) FE are included.

Table 18: D-in-D Regression on Amniocentesis Use among Chinese

Outcome	Birth Weight	Low Birth Weight	Pregnancy Hypertension	Congenital Anomalies
$Amnio$	-34.59***	0.0175***	0.00787***	0.00850***
	(4.960)	(0.00216)	(0.00107)	(0.00103)
$Female$	-102.1***	0.00832***	0.000746**	-0.00171***
	(1.700)	(0.000741)	(0.000367)	(0.000354)
$Amnio \times Female$	12.56*	-0.00341	0.00178	0.000381
	(6.957)	(0.00303)	(0.00150)	(0.00145)
Constant	3119.9***	0.113***	0.0142	0.0376***
	(71.40)	(0.0311)	(0.0154)	(0.0144)
N	370440	370440	368107	340473

$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$ Standard errors in parentheses

Data source: U.S Vital Statistics micro data.

Table 19: IV Regression on Amniocentesis Use among Chinese

Outcome	Birth Weight	Low Birth Weight	Pregnancy Hypertension	Congenital Anomalies
Panel A: First Stage				
$\overline{Amnio}^W$	0.527***	0.527***	0.531***	0.572***
	(0.00821)	(0.00821)	(0.00825)	(0.00891)
Panel B: Second Stage				
$\widehat{Amnio}$	-28.67	0.0402**	0.0214***	0.0236***
	(38.17)	(0.0169)	(0.00812)	(0.00760)
$Female$	-98.94***	0.00680***	-0.000279	-0.00195***
	(1.993)	(0.000907)	(0.000417)	(0.000438)
$\widehat{Amnio} \times Female$	-40.84*	0.0225**	0.0192***	0.00452
	(23.21)	(0.0102)	(0.00534)	(0.00506)
Constant	3119.0***	0.114**	0.0145	0.0377
	(77.65)	(0.0445)	(0.0203)	(0.0274)
N	370433	370433	368100	340469

$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.1$ Standard errors in parentheses

Data source: U.S Vital Statistics micro data.