

SUPPLEMENTARY ONLINE APPENDIX

Table A1: Five-state sample: Data summary

| Year | AZ | CA | MD | NJ | NY | Total |
|-------|-------|--------|-------|-------|-------|--------|
| 1991 | 0 | 1,430 | 0 | 0 | 0 | 1,430 |
| 1992 | 0 | 1,428 | 0 | 0 | 0 | 1,428 |
| 1993 | 0 | 1,346 | 0 | 0 | 0 | 1,346 |
| 1994 | 0 | 1,410 | 0 | 0 | 0 | 1,410 |
| 1995 | 0 | 1,365 | 251 | 433 | 921 | 2,970 |
| 1996 | 0 | 1,400 | 232 | 372 | 797 | 2,801 |
| 1997 | 0 | 1,317 | 212 | 408 | 838 | 2,775 |
| 1998 | 0 | 1,380 | 211 | 412 | 772 | 2,775 |
| 1999 | 0 | 1,333 | 259 | 649 | 882 | 3,123 |
| 2000 | 0 | 1,387 | 237 | 395 | 842 | 2,861 |
| 2001 | 138 | 1,380 | 245 | 383 | 0 | 2,146 |
| 2002 | 176 | 1,352 | 249 | 393 | 0 | 2,170 |
| 2003 | 184 | 0 | 271 | 404 | 0 | 859 |
| 2004 | 262 | 0 | 250 | 409 | 0 | 921 |
| 2005 | 271 | 0 | 249 | 385 | 0 | 905 |
| 2006 | 325 | 0 | 293 | 397 | 0 | 1,015 |
| Total | 1,356 | 16,528 | 2,959 | 5,040 | 5,052 | 30,935 |

Notes: Table displays years for which each of our state data sets are available, and the relevant sample sizes for births within 3 ounces of 1500 grams.

Table A2: Selected covariate comparison (controlling for trends in birth weight)

| | adjusted mean below threshold (1) | raw mean above threshold (2) | p-value ¹ (3) | p-value ² (4) |
|--------------------------------------|---|------------------------------------|-----------------------------|-----------------------------|
| Fewer than 7 Prenatal visits | 0.3212 | 0.3172 | (0.310) | (0.702) |
| First birth | 0.4109 | 0.4149 | (0.418) | (0.503) |
| Mother's Age | 26.67 | 26.43 | (0.000)** | (0.339) |
| Mother's Education: <High School | 0.2473 | 0.2503 | (0.518) | (0.577) |
| Mother's Education: High School | 0.3338 | 0.3358 | (0.710) | (0.876) |
| Mother's Education: Some College | 0.1784 | 0.1734 | (0.132) | (0.239) |
| Mother's Education: College+ | 0.1521 | 0.1501 | (0.489) | (0.769) |
| Mother's Education: Missing | 0.0875 | 0.0905 | (0.204) | (0.721) |
| Mother born outside state | 0.4139 | 0.4079 | (0.166) | (0.650) |
| Mother's Race: White | 0.4483 | 0.4493 | (0.773) | (0.920) |
| Mother's Race: African American | 0.2549 | 0.2539 | (0.816) | (0.906) |
| Mother's Race: Hispanic | 0.1399 | 0.1279 | (0.000)** | (0.537) |
| Father's Age | 30.03 | 29.87 | (0.037)* | (0.440) |
| Missing Father's Age | 0.2390 | 0.2434 | (0.267) | (0.549) |
| Father's Education: <High School | 0.1284 | 0.1274 | (0.813) | (0.834) |
| Father's Education: High School | 0.2642 | 0.2652 | (0.854) | (0.927) |
| Father's Education: Some College | 0.0997 | 0.0987 | (0.811) | (0.806) |
| Father's Education: College+ | 0.1051 | 0.1071 | (0.672) | (0.689) |
| Father's Education: Missing | 0.4026 | 0.4016 | (0.901) | (0.953) |
| Male | 0.5004 | 0.5024 | (0.720) | (0.752) |
| Gestational Age | 32.29 | 32.47 | (0.000)** | (0.003)** |
| Singleton Birth | 0.7372 | 0.7452 | (0.054) | (0.316) |
| Twin Birth | 0.2229 | 0.2189 | (0.236) | (0.298) |
| Multiple (non-twin) Birth | 0.0389 | 0.0359 | (0.060) | (0.439) |
| Vaginal Birth | 0.4582 | 0.4662 | (0.147) | (0.267) |
| Obstetric Procedures: Amnioscentesis | 0.0520 | 0.0510 | (0.616) | (0.762) |
| Obstetric Procedures: Induction | 0.1048 | 0.0978 | (0.037)* | (0.381) |
| Obstetric Procedures: Stimulation | 0.0682 | 0.0642 | (0.125) | (0.387) |
| Obstetric Procedures: Tocolysis | 0.1296 | 0.1166 | (0.000)** | (0.298) |
| Obstetric Procedures: Ultrasound | 0.6607 | 0.6497 | (0.035)* | (0.369) |
| Obstetric Procedures: Other | 0.0690 | 0.0630 | (0.022)* | (0.641) |
| Year of Birth | 1993.61 | 1993.03 | (0.000)** | (0.409) |
| Predicted 1-year Mortality | 0.0551 | 0.0575 | (0.000)** | (0.391) |

Notes: Data is NCHS birth cohort linked birth/infant death files, 1983-1991 and 1995-2003, as described in the text. For most covariates, the number of observations is 341,140. Delivery method is available for 229,843 births; obstretic procedures are available for 229,175 births. * significant at 5%; ** significant at 1%. Column (3) reports p-values calculated from heteroskedastic-robust standard errors; column (4) reports p-values calculated from standard errors clustered at the gram level.

Table A3: Bandwidth sensitivity

A. NCHS Nationwide Data

| Dependent variable: | 1-year | | | | |
|--|------------------------|------------------------|-----------------------|-------------------------|-------------------------|
| | Mortality | | | | |
| Bandwidth | 30 | 60 | 90 | 120 | 150 |
| Birth weight < 1500g | -0.0267 (0.00382)** | -0.0162 (0.00269)** | -0.0114 (0.0022)** | -0.00911 (0.00190)** | -0.00865 (0.00170)** |
| Mean of dependent variable above cutoff: | 0.0607 | 0.0562 | 0.0545 | 0.0532 | 0.0515 |
| Observations | 72937 | 163415 | 233880 | 304630 | 376400 |

| Dependent variable: | 28-Day | | | | |
|--|------------------------|------------------------|------------------------|-------------------------|-------------------------|
| | Mortality | | | | |
| Bandwidth | 30 | 60 | 90 | 120 | 150 |
| Birth weight < 1500g | -0.0228 (0.00322)** | -0.0146 (0.00227)** | -0.0101 (0.00185)** | -0.00828 (0.00160)** | -0.00773 (0.00143)** |
| Mean of dependent variable above cutoff: | 0.0431 | 0.0390 | 0.0377 | 0.0367 | 0.0352 |
| Observations | 72937 | 163415 | 233880 | 304630 | 376400 |

B. 5-State Sample

| Dependent variable: | Hospital | | | | |
|--|-----------------|------------------|------------------|------------------|------------------|
| | Charges | | | | |
| Bandwidth | 30 | 60 | 90 | 120 | 150 |
| Birth weight < 1500g | 7670 (4300)* | 8380 (3210)** | 9290 (2630)** | 8070 (2270)** | 6490 (2030)** |
| Mean of dependent variable above cutoff: | 83890 | 81527 | 80235 | 79092 | 77158 |
| Observations | 10533 | 21404 | 31990 | 42012 | 52471 |

| Dependent variable: | Hospital | | | | |
|--|-----------------|------------------|------------------|-----------------|-----------------|
| | Costs | | | | |
| Bandwidth | 30 | 60 | 90 | 120 | 150 |
| Birth weight < 1500g | 4460 (1880)* | 3620 (1390)** | 3970 (1140)** | 3410 (985)** | 2580 (881)** |
| Mean of dependent variable above cutoff: | 41063 | 39321 | 38572 | 38028 | 37094 |
| Observations | 10533 | 21404 | 31990 | 42012 | 52471 |

| Dependent variable: | Length of | | | | |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|
| | Stay | | | | |
| Bandwidth | 30 | 60 | 90 | 120 | 150 |
| Birth weight < 1500g | 2.38 (0.743)** | 1.84 (0.536)** | 1.91 (0.439)** | 1.53 (0.379)** | 1.14 (0.340)** |
| Mean of dependent variable above cutoff: | 25.7 | 24.8 | 24.3 | 24.0 | 23.5 |
| Observations | 11254 | 22877 | 34183 | 44868 | 56067 |

Notes: All models are local linear regressions, estimated on the specified bandwidth of grams above and below VLBW threshold. All models include linear gram-trend variables and our “main controls,” which vary by the sample used and are described in the notes in the previous tables. Some observations have missing charges, as described in the text. * significant at 5%; ** significant at 1%. Heteroskedastic-robust standard errors in parentheses.

Table A4: Polynomial order sensitivity

A. NCHS Nationwide Data

| Dependent variable: | 1-year Mortality | | | |
|--|-----------------------------------|-----------------------------------|----------------------------------|---------------------------------|
| | Polynomial of order: 1 | 2 | 3 | 4 |
| Birth weight < 1500g | -0.0072 (0.0022)** [0.0040] | -0.0103 (0.0038)** [0.0067] | -0.0143 (0.0062)* [0.0099] | -0.0144 (0.0082) [0.0122] |
| Mean of dependent variable above cutoff: | 0.0553 | | | |
| Observations | 202071 | | | |

B. 5-State Sample

| Dependent variable: | Hospital Charges | | | |
|--|-------------------------------|-----------------------------|-----------------------------|------------------------------|
| | Polynomial of order: 1 | 2 | 3 | 4 |
| Birth weight < 1500g | 9,065 (2,297)** [5,094] | 4,809 (3,363) [7,099] | 2,350 (4,442) [9,325] | 6,688 (5,879) [12,508] |
| Mean of dependent variable above cutoff: | 81566 | | | |
| Observations | 28928 | | | |

Notes: All models are OLS, estimated on a sample within 3 ounces above and below VLBW threshold. All models include the gram-trend variables of the stated polynomial order and our “main controls,” which vary by the sample used and are described in the notes in the previous tables. Some observations have missing charges, as described in the text. * significant at 5%; ** significant at 1%. Heteroskedastic-robust standard errors in parentheses; standard errors clustered at the gram level in brackets.

Table A5: Coefficients on selected covariates

| | Sample: NCHS Nationwide Data Dependent variable: 1-year mortality | | Multi-State Sample hospital charges |
|--|--|--|--|
| Birth weight < 1500g | -0.0072 (0.0022)** | Birth weight < 1500g | 9,065 (2,297)** |
| Birth weight < 1500g * Grams from cutoff (100s) | -0.0111 (0.0032)** | Birth weight < 1500g * Grams from cutoff (100s) | 617 (3,463) |
| Birth weight >= 1500g * Grams from cutoff (100s) | -0.0184 (0.0029)** | Birth weight >= 1500g * Grams from cutoff (100s) | -7,951 (2,823)** |
| Prenatal Visits: 7-10 | -0.0063 (0.0014)** | =1 if newborn is male and not missing | 11,611 (1,145)** |
| Prenatal Visits: >=11 | -0.0065 (0.0015)** | Pre-term birth | 22,958 (1,688)** |
| Mother born outside state | -0.0012 (0.0011) | Mother's Race/Ethnicity: African American | 1,827 (1,481) |
| First Birth | 0.0191 (0.0012)** | Mother's Race/Ethnicity: Other | 4,533 (1,600)** |
| Mother's Age: 31-35 (compared to <16) | -0.0129 (0.0049)** | Twin birth | 3,405 (1,346)* |
| Mother's Age: 36-40 | -0.0118 (0.0051)* | Multiple (non-twin) birth | 11,835 (2,354)** |
| Mother's Age: 41+ | -0.0007 (0.0065) | Cesarean Section | 2,770 (1,199)* |
| Mother's Education: High School | 0.0004 (0.0015) | Arizona (compared to MD) | -1,653 (2,484) |
| Mother's Education: Some College | -0.0025 (0.0017) | California | 101,580 (1,805)** |
| Mother's Education: College+ | 0.0037 (0.0019) | New Jersey | 87,235 (1,608)** |
| Mother's Education: missing | 0.0177 (0.0028)** | New York | 60,591 (1,500)** |
| Father's Age: 31-35 (compared to <16) | -0.0009 (0.0188) | Year = 1991 (compared to 2003) | -92,968 (4,690)** |
| Father's Age: 36-40 | -0.0012 (0.0188) | Year = 2006 | 3,937 (4,694) |
| Father's Age: 41+ | -0.0041 (0.0188) | Constant | 31,557 (4,237)** |
| Father's Age: missing | 0.0020 (0.0187) | | |
| Male | 0.0144 (0.0010)** | | |
| Gestational Age: 37 weeks (compared to <31) | 0.0256 (0.0038)** | | |
| Gestational Age: 40 weeks | 0.0124 (0.0053)* | | |
| Gestational Age: 42+ weeks | 0.0081 (0.0052) | | |
| Mother's Race/Ethnicity: African American | -0.0191 (0.0014)** | | |
| Mother's Race/Ethnicity: Hispanic | -0.0035 (0.0019) | | |
| Singleton birth | 0.0442 (0.0018)** | | |
| Twin birth | 0.0113 (0.0017)** | | |
| Year = 2002 (compared to 1984) | -0.0354 (0.0035)** | | |
| Constant | 0.0489 (0.0243)* | | |
| Mean of dependent variable above cutoff: | 0.0553 | | 81566 |
| Observations | 202071 | | 28928 |

Notes: All models are OLS, estimated on a sample within 3 ounces above and below VLBW threshold. Charges are in \$2006. Some observations have missing charges, as described in the text. We only show a sub-set of the coefficients on these covariates in order to keep the table to one page. Five states include AZ, CA, MD, NY, and NJ (various years) * significant at 5%; ** significant at 1%. Heteroskedastic-robust standard errors in parentheses.

Table A6: Alternative first stage outcomes

| | Dependent variable: | hospital costs | | log(hospital costs) | log(hospital charges) | median regression | log(length of stay) |
|--|---------------------|----------------|----------------|---------------------|-----------------------|---------------------|---------------------|
| | | hospital costs | hospital costs | log(hospital costs) | log(hospital charges) | hospital charges | log(length of stay) |
| Birth weight < 1500g | | 4189 | 3795 | 0.263 | 0.263 | 9415 | 0.140 |
| | | (1066)** | (1030) | (0.106)** | (0.035)** | (1593)** | (0.0272)** |
| | | [2610] | [2399] | [0.1060]* | [0.1059]* | CI: [1485, 21526]** | [0.0713] |
| Sample | | 5-State | 5-State | 5-State | 5-State | 5-State | 5-State |
| Controls | | No | Yes | Yes | Yes | Yes | Yes |
| Mean of dependent variable above cutoff: | | 39410 | 39410 | 9.91 | 10.58 | 81566 | 2.78 |
| Observations | | 28928 | 28928 | 28769 | 28769 | 28928 | 30935 |

| | Dependent variable: | hospital transfer | hospital charges including transfers | hospital costs including transfers | log(charges) including transfers | log(length of stay) including transfers |
|--|---------------------|-------------------|--------------------------------------|------------------------------------|----------------------------------|---|
| | | hospital transfer | hospital charges including transfers | hospital costs including transfers | log(charges) including transfers | log(length of stay) including transfers |
| Birth weight < 1500g | | -0.011 | 7297 | 2872 | 0.223 | 0.1088 |
| | | (0.0067) | (4313) | (1776) | (0.045)** | (0.0319)** |
| | | [0.0128] | [6,021] | [2,529] | [0.0707]** | [0.0388]** |
| Sample | | 5-State | California | California | California | California |
| Controls | | Yes | Yes | Yes | Yes | Yes |
| Mean of dependent variable above cutoff: | | 0.100 | 109421 | 45141 | 11.0 | 2.99 |
| Observations | | 30935 | 14560 | 14560 | 14560 | 16528 |

Notes: All models are OLS except the median regression, and all are estimated on a sample within 3 ounces above and below VLBW threshold. All models include the gram-trend variables and our “main controls,” which are listed in Table A5, as well as indicators for each year. Charges are in 2006 dollars. Some observations have missing or zero charges, as described in the text. Five states include AZ, CA, MD, NY, and NJ (various years). * significant at 5%; ** significant at 1%. Heteroskedastic-robust standard errors in parentheses; standard errors clustered at the gram level in brackets. The 95% confidence interval reported for the median regression was bootstrapped, with 500 samples clustered by birth weight.

Table A7: Results by year and for overlap of NCHS/five-state data

A. NCHS Nationwide Data

| Dependent variable: 1-year mortality | Years: | | | | In-hospital births only | |
|--|-------------------------------------|---------------------------------|---------------------------------|----------------------------------|---------------------------------|---|
| | 1983-1987 | 1988-1991 | 1995-1998 | 1999-2002 | Five states, all NCHS years | Five states, years in NCHS and multi-state data |
| | | | | | 1983-2002 (available years) | 1991; 1995-2002 |
| Birth weight < 1500g | -0.0144 (0.0051)** [0.0052]** | -0.0076 (0.0048) [0.0063] | -0.0006 (0.0038) [0.0056] | -0.0070 (0.0035)* [0.0037] | -0.0104 (0.0042) [0.0077] | -0.0074 (0.0051) [0.0063] |
| Mean of dependent variable above cutoff: | 0.0813 | 0.0622 | 0.0410 | 0.0378 | 0.054 | 0.039 |
| Observations | 50947 | 47545 | 49989 | 53590 | 49399 | 23698 |

B. Multi-State Sample

| Dependent variable: | hospital charges | hospital charges | hospital charges | hospital charges | In-hospital births only | |
|--|-----------------------------------|-------------------------------|------------------------------------|-------------------------------|---------------------------------------|-----------------------------|
| | | | | | hospital charges | hospital costs |
| | | | | | Years in NCHS and multi-state data | |
| | 1991-1994 | 1995-1998 | 1999-2002 | 2003-2006 | 1991; 1995-2002 | 1991; 1995-2002 |
| Birth weight < 1500g | 12055.25 (4,538)** [4,799]* | 3514.89 (3,167) [5,426] | 16985.481 (4,930)** [7,998]* | 582.315 (6,151) [7,149] | 10108 (2738)** [5,947] | 4553 (1242)** [2,791] |
| Mean of dependent variable above cutoff: | 69566 | 71392 | 93717 | 96124 | 80721 | 39946 |
| Observations | 5018 | 10711 | 9504 | 3695 | 21479 | 21479 |

∞

Notes: All models are OLS, estimated on a sample within 3 ounces above and below VLBW threshold. All models include the gram-trend variables. The first four columns include our “main controls,” which vary by the sample used and are described in the notes in the previous tables. The last two columns include common covariates across samples: indicators for whether the baby is male, preterm, black, “other” race, a twin, or a non-twin multiple birth, as well as state indicators and year indicators. Although in theory the births included in the NCHS birth records in the state-years available in our multi-state sample should be the same as the births included in the multi-state sample, in practice the samples are slightly different (as evidenced by the difference in sample size), largely due to 300-400 fewer births in the discharge data in each year from 2000-2002. Some observations have missing charges, as described in the text. * significant at 5%; ** significant at 1%. Robust standard errors in parentheses.

Table A8: One-year mortality results by cause of death

one-year mortality, partitioned by broad cause-of-death categories

| Dependent variable: | infectious and | neoplasms | endocrine, | nervous | respiratory | digestive | congenital | perinatal | symptoms, | other |
|--|---------------------------------|--------------------------------|--------------------------------|-------------------------------------|--------------------------------|---------------------------------|--------------------------------|---------------------------------|---------------------------------|---------------------------------|
| | parasitic | | nutritional, | | | | | | system, sense | |
| Model: | diseases | | metabolic, | disorders | disorders | disorders | anomalies | conditions | defined | |
| | OLS | OLS | immunity, | organ disorders | disorders | disorders | OLS | OLS | conditions | OLS |
| Birth weight < 1500g | -0.0026 (0.0055) [0.0061] | 0.0009 (0.0025) [0.0018] | 0.0024 (0.0031) [0.0028] | -0.0141 (0.0050)** [0.0041]** | 0.0015 (0.0071) [0.0057] | -0.0003 (0.0051) [0.0035] | 0.0022 (0.0178) [0.0102] | -0.0206 (0.0179) [0.0156] | 0.0185 (0.0107) [0.0084]* | 0.0121 (0.0093) [0.0060]* |
| Trend controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Main controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Mean of dependent variable above cutoff: | 0.0222 | 0.0034 | 0.0050 | 0.0199 | 0.0334 | 0.0151 | 0.4164 | 0.3410 | 0.0850 | 0.0585 |

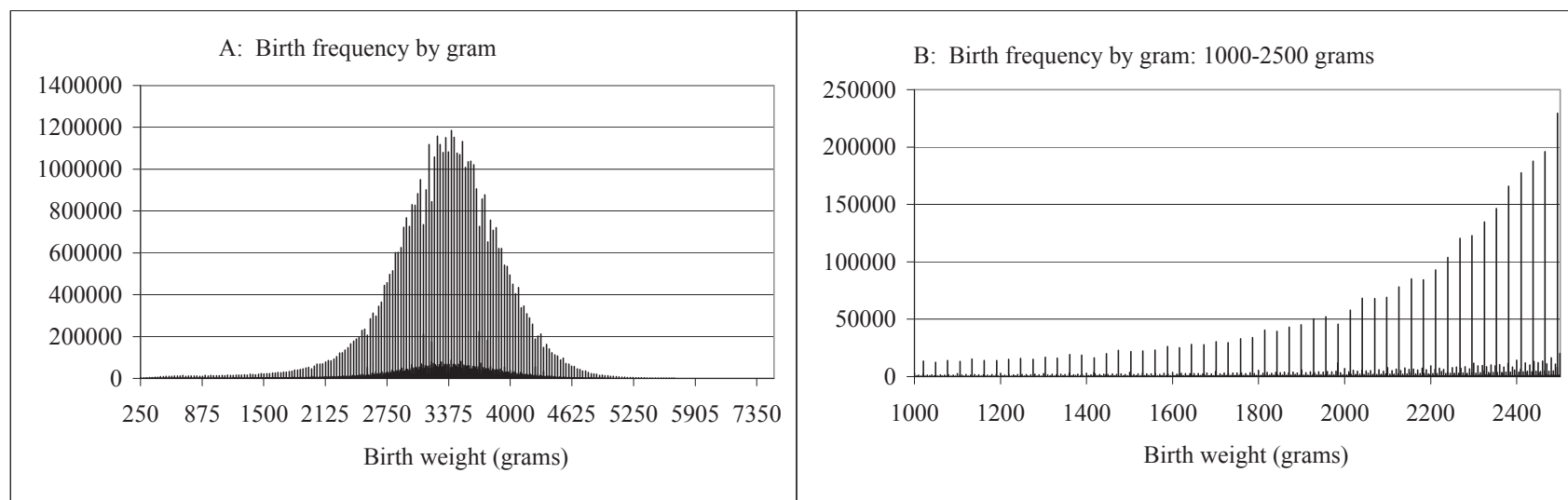
one-year mortality, by selected individual causes of death (not a partition)

| Dependent variable: | "external" | respiratory | sudden infant | jaundice | meningitis |
|--|--------------------------------|--------------------------------|---------------------------------|-----------------------------------|---------------------------------|
| | cause | distress | death | | |
| Model: | OLS | syndrome | syndrome | OLS | OLS |
| Birth weight < 1500g | 0.0042 (0.0048) [0.0034] | 0.0008 (0.0106) [0.0085] | 0.0166 (0.0093) [0.0068]* | -0.0030 (0.0018) [0.0011]** | -0.0021 (0.0030) [0.0036] |
| Trend controls | Yes | Yes | Yes | Yes | Yes |
| Year controls | Yes | Yes | Yes | Yes | Yes |
| Main controls | Yes | Yes | Yes | Yes | Yes |
| Mean of dependent variable above cutoff: | 0.0139 | 0.0802 | 0.0617 | 0.0025 | 0.0050 |

Observations 11090

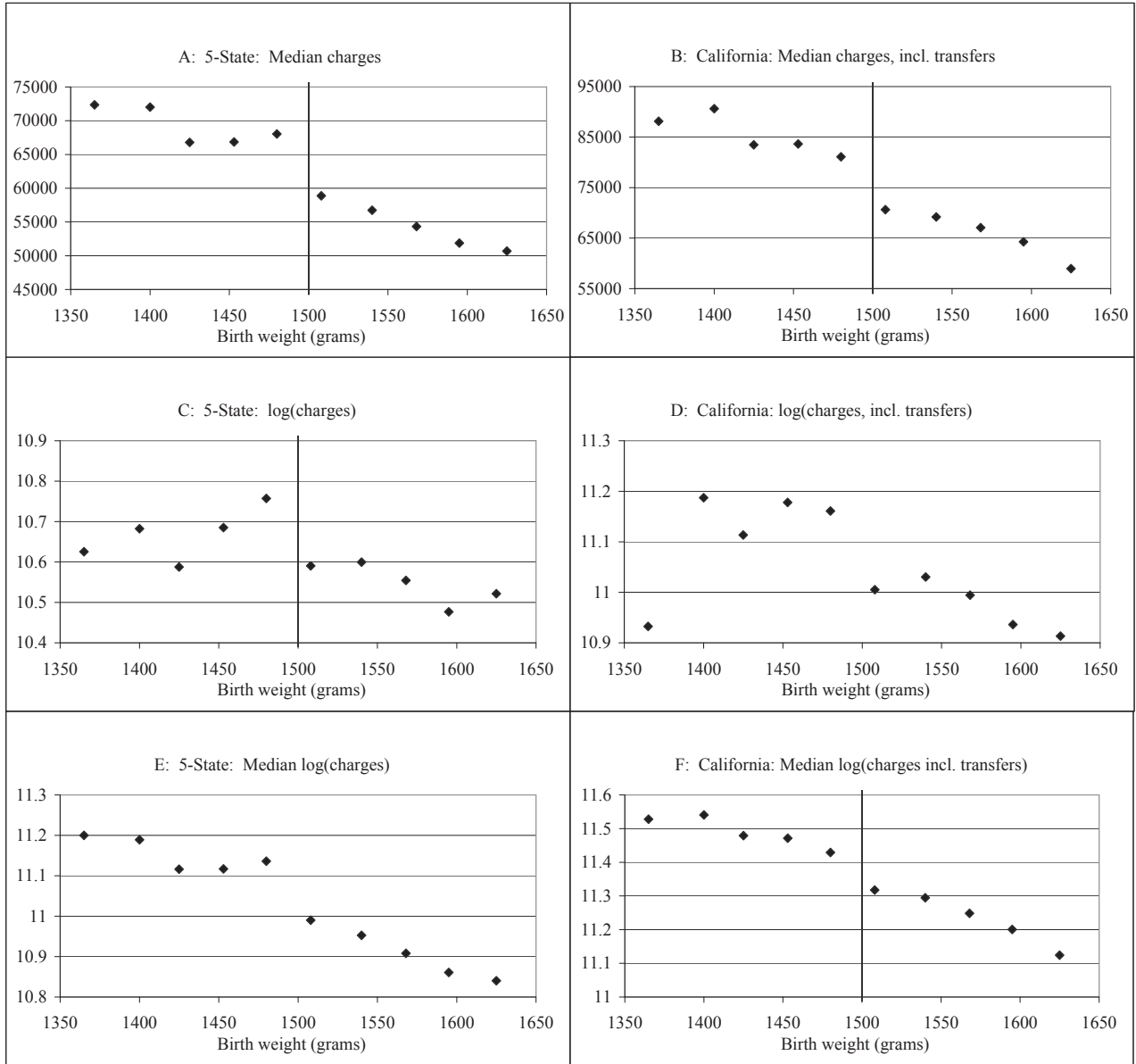
Notes: This table presents results by cause of death among infants who died within one year of birth (that is, the sample is *not* all infants but rather all infants who died within one year of birth). The ten cause of death classifications (other than all cause mortality) in the first row were constructed to be categories which could be defined consistently over time, across a change in cause of death coding which occurs partway through our sample; these broad categories partition non-missing causes of death. The second row extracts some individual causes of death from these broad categories. We exclude observations with missing information on the timing or cause of death. OLS models estimated on a sample within 3 ounces above and below the VLBW threshold. All models include the gram-trend variables. * significant at 5%; ** significant at 1%. Heteroskedastic-robust standard errors in parentheses; standard errors clustered at the gram level in brackets.

Figure A1: Birth frequencies for wider bandwidths



Notes: NCHS birth cohort linked birth/infant death files, 1983-1991 and 1995-2003, as described in the text.

Figure A2: Alternative first stage outcomes



Notes: Data are all births in the five-state sample (AZ, CA, MD, NY, and NJ), as described in the text. Some observations have missing or zero charges, as described in the text. Charges are in 2006 dollars. Points represent gram-equivalents of ounce intervals, with births grouped into one-ounce bins radiating from 1500 grams; the estimates are plotted at the median birth weight in each bin. *Discussion:* The upward slope for log charges in Panel C is largely driven by newborns with few charges. The upward slope disappears when the sample is restricted to newborns with greater the \$3,000 in charges. A plot of an indicator that the newborn accrued charges of less than \$3,000 against birth weight revealed a fairly noisy series. Further, when data from hospitals where newborns were transferred are included using the longitudinal data from California (panel D), log charges are relatively flat at 11.17 in the one-ounce bins just before the threshold and drop to 11.00 after the threshold. Panels E and F report similar estimates to the main results when median log charges are compared in both the five-state sample and in the California sample.