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AUTHOR	Roth, Jeffrey; Figlio, David N.; Chen, Yuwen; Carter, Randy L.; Ariet, Mario; Resnick, Michael B.
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ABSTRACT

This study attempted to estimate special education expenditures at kindergarten from material and infant medical and sociodemographic factors known at birth. The study consisted of all students born in Florida between September 1, 1990 and August 31, 1991 who subsequently attended kindergarten in Florida. A total of 125,430 birth records were successfully matched with education databases. Predictors included Medicaid eligibility at birth, poverty at school age, mother's level of education, previous pregnancy experience, maternal age, and infant birth weight. Ordered probit regression analysis was performed on the data. The outcome variable was state educational expenditure on the student through completion of kindergarten. Variables that best predicted educational costs by the end of kindergarten included: low birth weight, congenital anomaly, male gender, no prenatal care, Medicaid eligibility at birth, and school age poverty. Results suggest that, since the factors with the greatest estimated effects on kindergarten costs are perinatal conditions and family background factors, high risk infants can be identified at birth, and therefore physicians, educators, social workers, and policymakers should coordinate efforts in allocating resources for children with special needs. (Contains 19 references and 4 tables.) (DB)

Birth Conditions and Special Education Costs at Kindergarten

Jeffrey Roth

David N. Figlio

Yuwen Chen

Randy L. Carter

Mario Ariet

Michael B. Resnick

College of Medicine and

Warrington College of Business

University of Florida

and the National Bureau of Economic Research

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Corresponding Author:

Jeffrey Roth

PO Box 100296

Gainesville, FL 32610-0296

Phone: (352) 334-1360

Fax: (352) 334-1361

E-mail: jeffroth@ufl.edu

Birth Conditions and Special Education Costs at Kindergarten

CONTEXT

Advances in perinatal medicine over the last decade and a half have resulted in improved survival of very premature and sick infants.[1] As survival has improved, however, concern has increasingly been expressed about the long-term developmental outcome of children who receive prophylactic and rescue treatment in neonatal intensive care nurseries.[2] For example, the recent joint statement by the American Academy of Pediatrics and Canadian Pediatric Society discouraging routine use of postnatal corticosteroids to treat or prevent chronic lung disease in preterm infants cited several studies that had found evidence of neurodevelopmental impairments at two years of age with administration of dexamethasone within the first 96 hours of life.[3] Other interventions to sustain premature infants' respiratory system (e.g., mechanical ventilation with oxygen, nitric oxide, antenatal corticosteroids) have also been shown to have early beneficial effects but later adverse sequelae.[4-6]

Salvaging greater numbers of very premature infants (<28 weeks gestational age) has been reflected in rising rates of low birth weight (LBW = <2500 g). From 1986 to 1998, the LBW rate in the U.S. rose from 6.8% to 7.6%.[7] Preterm LBW infants are much more likely to exhibit developmental delays, functional limitations, and impairments.[8] When these LBW children reach school age, they are 50% more likely than children born at normal birth weight to require special education services.[9] Included within the LBW group are children born very low birth weight (<1500 g). It has been estimated that up to 60% of VLBW infants exhibit learning disabilities by the time they reach school age.[10]

States and public school districts are required by federal law to provide adequate and necessary educational services for children with disabilities. However, this mandate can have significant financial implications for school districts and states, as the special education rate in some districts exceeds one-third of the student body. Parrish reported that American schools spent nearly $40 billion on special education in 1993, a figure that is clearly much higher today.[11] Chambers estimated that marginal special education costs per student are several times higher than marginal costs for regular education students.[12] In order to ensure adequate provision of special education services, states put in place fiscal incentives for school districts to classify students as special education. Cullen and Figlio showed that school districts may respond to these incentives by classifying marginally disabled students into more needy categories than their services warrant, further increasing special education expenditures.[13] These expenditures o not come free. States must raise taxes or cut back on other expenditure categories to fund the mandated special education costs. In an analysis of Texas's special education system, Cullen demonstrated that increased special education placement led to a reduction in spending on regular-education students. [14]

Resnick et al found that while sociodemographic factors at birth were most important in predicting educational outcomes at kindergarten, adverse perinatal conditions also played a significant role.[15] The current study builds upon that earlier categorical analysis of special education placement in Florida kindergarten classes and quantifies the fiscal implications of low birth weight and other perinatal conditions on school finance. The end point is again kindergarten. Later birth and kindergarten cohorts are used and model-based estimates of special education costs are generated.

Because several special education conditions are not typically identified until later grades in elementary school, this study does not provide a comprehensive quantification of cumulative special education costs. Rather it seeks to identify those birth conditions which have the largest fiscal impact at entry into public school. Additional costs of providing special education services for greater numbers of surviving NICU graduates may possibly result in increased tax burdens, or alternatively may lead to reduced services in other areas. The results of this analysis may have substantial implications for the design and implementation of school finance reforms and other fiscal redistributions.

Several studies have attempted to estimate the total costs of resources (health care, education, child care) consumed by low birth weight infants.[16-18] We know of only one U.S. study linking low birth weight to special education costs exclusively. Chaikind and Corman studied the issue using a 1988 national dataset that, while representative, was extremely limited in scale.[9] The present analysis has three major advantages over that earlier study: (1) it uses more current data and therefore is more reflective of current allocations of special education costs; (2) it examines an entire state's population, so that comparisons may be made to other state education systems; and (3) the resultant large sample size permits attention to be focused on rare but extremely costly special education conditions as well as more commonplace ones. In sum, the purpose of the present study is to estimate special education expenditures at kindergarten from maternal and infant medical and sociodemographic factors known at birth. In so doing, it has the potential to substantially improve knowledge on the fiscal implications of birth conditions on school resource allocation.

METHODS

Study Participants

The study consisted of children born in the state of Florida between September 1, 1990 and August 31, 1991 who normally would enter kindergarten in the 1996-97 academic year. However, since some parents of children in this birth cohort apparently elected to enroll their child one year later, we examined kindergarten records for three subsequent academic years. By doing so, we were also able to determine which students were required to repeat kindergarten. Thus, all students in the 1990-91 birth cohort who subsequently entered kindergarten in Florida anytime between 1996 and 1999 were included in the study.

The birth cohort was generated from records in the Florida Department of Health Vital Statistics database. Birth records were then linked to school records obtained from the Florida Department of Education (DOE) databases for the relevant academic years. Of the 197 659 infants born in Florida during 1990-91, 125 430, or 63.5 percent, were matched successfully with DOE records. The remaining 36.5 percent were unmatched for one of three reasons: 1) the child moved out-of-state following birth; 2) the child attended kindergarten in a private school; or 3) DOE records and birth records could not be linked because of name changes or incorrectly entered identifiers. Historically, about twenty percent of children born in Florida leave the state prior to school age, and about twelve percent attend private kindergarten. Therefore, it is expected that around five percent of the potential sample were students who could conceivably have been matched but who were not.

To determine the representativeness of the merged sample, we present in Table 1 a comparison of the merged sample and the entire birth cohort for all predictor variables. The merged sample is similar to the potential population along most observed dimensions. The sole dimension of comparison where the sample deviates from the potential population involves maternal Medicaid eligibility. Medicaid-eligible children are more likely to be observed later in the DOE records. This discrepancy may be due to the fact that low-income families are less likely to send their children to private schools, or to the possibility that low-income families are less likely to leave the state. Nevertheless, because of the potential for selection bias, we repeated all estimation for Medicaid and non-Medicaid subpopulations to ensure that the central findings are not sensitive to the over-representation of Medicaid families in the analysis dataset.

Variables

Outcome Variable. The dependent variable was set to the natural logarithm of state expenditure on the student through his or her completion of kindergarten, expressed in constant dollars. Students incur additional costs to the state for one of two reasons: (1) they are classified into a special education category by the school district; or (2) they are retained for an additional year of kindergarten. We derive costs from the student's primary exceptionality code in the student's Federal/State Indicator record in the DOE database. Each exceptionality generates a different amount of state funding to the school district. For students with multiple exceptionalities, the highest-weighted exceptionality code was employed in the analysis.

Procedures for eligibility determination and classification of primary exceptionality are standardized throughout the state's 67 school districts. Placement criteria are dictated by Florida Board of Education Rules in accordance with Federal guidelines and monitored by the Florida Bureau of Student Services and Exceptional Education. These definitions and eligible criteria that classify children into special education categories are comprehensive and require extensive multidisciplinary evaluation procedures by qualified professionals using widely accepted assessment tools and methods. Nevertheless, there remains considerable variation in the actual costs incurred to school districts within any given exceptionality classification. Each student, regardless of exceptionality classification, receives services through an Individualized Education Plan, and nationally, less than ten percent of the variation in total costs of providing appropriate special education services can be explained by exceptionality classification alone. This variation is not relevant to the present study since its primary purpose is to predict costs incurred by the state. However, if the goal is to predict total costs incurred by state and school district, our current measure is only a proxy. In the latter case, to the extent to which there exists measurement error in the dependent variable, this serves to understate the relationships estimated in the present paper.

Predictor variables. Two measures of poverty are used: Medicaid eligibility at the time of birth, and poverty at school age. Poverty at school age was defined as a child receiving free or reduced price lunch in kindergarten. Eligibility of free or reduced price lunch is based on family income and family size. Mothers are divided into four groups based on education: mothers who have not graduated from high school, mothers who graduated from high school but attended college for less than one year, mothers who attended college for one or more years, but did not complete four years, and mothers who completed four or more years of college. Previous pregnancy experience had 3 categories: previous adverse pregnancy outcome (including any elective or spontaneous terminations or child death occurring after a live birth), no previous pregnancy experience, and 1 or more previous successful pregnancies. Four categories of maternal age were considered: a young teenage group (11-17 years), a late teenage group (18 to 19), women of 20 to 35 years of age, and women over 35 years of age. Students were divided into the major racial/ethnic categories of white, black, Hispanic, Asian, American Indian, and mixed. Sex, congenital anomaly, complications of labor and delivery, and maternal marital status were dichotomous dummy variables.

We divided children into four groups by birth weight. Children weighing fewer than 1000 grams at birth were classified as extremely low birth weight, those weighing fewer than 1500 grams were classified very low birth weight, and those weighing fewer than 2500 grams were classified low birth weight. Birth records identify number of prenatal care visits. Because of differences across pregnancies, we created two dichotomous variables representing adequacy of prenatal care: no prenatal care, and four or fewer prenatal visits.

Statistical methods. While costs can, in principle, take on continuous values, in practice our measure of costs is a discrete dependent variable, with 60 different observed values, and considerable left-censoring (as 85 percent of students generate no observed additional costs incurred to the state.) This type of discrete dependent variable, where the outcomes are inherently ordered, lends itself to analysis with ordered multinomial-choice models.[19] We therefore employed an ordered probit model to estimate our regression model. Experiments with alternative models (i.e., ordered logit, tobit, binomial logit and binomial probit, as well as ordinary least squares) yielded comparable results in terms of statistical significance levels and signs, though, as all models are nonlinear, the magnitudes of the coefficient estimates are not directly comparable. To ease computational tractability and to facilitate presentation, log costs are rounded to the nearest integer value, reducing the set of values of the dependent variable to 12 observed values. Results are substantively invariant to the number of cut points employed in the ordered probit model. Specifically, models with 5, 15, 25 and 35 cut points were attempted; all led to effectively the same results.

Ordered probit regression typically makes the assumption that all observations are independent. However, since student disability classification and retention decisions are made at the district level, it may be that errors are correlated within school districts. Failure to account for this correlation would lead to downward-biased measures of standard errors. Therefore, the standard errors were adjusted to account for clustering as well as heteroskedasticity.

RESULTS

Table 2 presents the mean percentage distribution across all predictor variables for three subsamples: students incurring no additional costs to the state, students whose costs to the state are between one and three times that of a "regular" student, and students incurring three or more times the costs to the state of a "regular" student. Table 2 suggests that many of the predictor variables are correlated with costs in kindergarten. Students in impoverished families, those with teenaged mothers, and those with poorly educated mothers, for instance, tend to incur higher costs in kindergarten. Other variables follow similar trends. These patterns are particularly pronounced for low birth weight children. For example, while extremely low birth weight children make up only two-tenths of one percent of students incurring no additional costs to the state, they comprise 2.4 percent of students incurring three or more times the costs of a regular student. Similarly, low birth weight students account for 6 percent of the students incurring no additional costs, but account for 12 percent of students incurring three or more times the costs of a regular student.

Ordered probit regression results are presented in Table 3. The first column of Table 3 reports coefficient estimates and clustering and heteroskedasticity-corrected p-values for a model including all predictor variables described above. Because the ordered probit model is nonlinear, one cannot directly read effect sizes from the estimated coefficients. However, signs and statistical significance are still apparent. It is evident that birth conditions are strong predictors of future special education costs: Children with low birth weight generate substantially increased costs, a pattern particularly true for very low birth weight and especially extremely low birth weight children. Complications of labor and delivery and congenital anomalies are also both significantly related to increased special education costs in kindergarten. Children whose mothers had limited or no prenatal care also had higher rates of elevated costs, even when controlling for perinatal conditions. Given that much of the effect of prenatal care may come through perinatal conditions, the estimated coefficients on prenatal care can likely be thought of as "lower bound" estimates of their full effects.

Maternal and family characteristics matter as well. Family poverty at birth (proxied by Medicaid status) and at kindergarten (proxied by free/reduced price lunch eligibility) each have strong relationships with elevated costs. Maternal education has an independently positive effect, on the other hand. Children whose mothers have had one or more previous successful pregnancy tend to have higher costs than children whose mothers had either no previous pregnancy experience or those whose mothers had one or more previous adverse pregnancy outcome. White students tend to generate higher costs than do black, Hispanic, Asian, American Indian, or mixed-race students. Male students also tend to be costlier to educate in kindergarten. Of the background characteristics considered, only maternal age and marital status had no apparent relationship with student costs in kindergarten.

The preceding discussion implies that some of the effects of prenatal care might work through improved birth outcomes. Because of the potential implications for health care policy, it is important to gauge the estimated effects of prenatal care (and, for that matter, other prenatal variables) in models that exclude perinatal conditions. These results are presented in the second column of Table 3. While almost all coefficients are effectively unchanged, the coefficients on the prenatal care variables increase in magnitude by about half. This finding suggests that the estimated effects of prenatal care presented in Table 3 (and the implied effect sizes presented below) are **conservative** estimates of the full effects of prenatal care on kindergarten outcomes.

Effect Sizes

The estimated coefficients from the ordered probit model cannot be directly interpreted. However, they can be used to generate estimated changes in the probabilities of appearing in any given cost classification, as a first step toward measuring actual effect sizes. Table 4 presents the implied changes (generated from the point estimates presented in the first column of Table 3) in the probabilities of a student appearing in each of the six lowest-cost classifications, accounting for 99.7 percent of all students in the dataset. The implied changes in the probabilities of appearing in each of the six highest-cost groups follow the same patterns, but the fractions of students estimated to appear in these groups are trivial in magnitude, so these effects are not presented in the table. The final column of Table 4 presents the estimated average cost increase associated with each predictor variable. These figures take into account **all** predicted probabilities associated with each predictor variable, and not just the probabilities of appearing in the six high-prevalence groups presented in the table.

From the table it appears that the factors with the greatest estimated effects on kindergarten costs are perinatal conditions. Low birth weight children are estimated to generate 22 percent higher costs than are children of normal birth weight, while very low birth weight children generate 49 percent higher costs and extremely low birth weight children generate 71 percent higher costs. Children born with congenital anomalies have 29 percent higher costs than those without anomalies. Complications of labor and delivery are associated with about 5 percent higher costs, all else equal.

Prenatal care is associated with improved outcomes as well. Children whose mothers had between 1 and 4 prenatal visits have 7 percent higher costs, all else equal (11 percent higher costs when perinatal conditions are excluded from the model; these are likely the upper bounds of the prenatal care effect.) Children whose mothers had no prenatal visits generate 13 percent higher costs (17 percent higher when perinatal conditions are excluded.)

Background factors matter as well. Poverty at birth and at school age are each associated with 15-17 percent higher costs. Maternal high school dropouts generate 13 percent higher costs than do maternal high school graduates, and 16 percent higher costs than do maternal college graduates. White students generate 19 percent higher costs than do black students, 37 percent higher costs than do Hispanic students, and 36 percent higher costs than do Asian students. Mothers with previous adverse pregnancy outcomes have children who tend to generate 6 percent lower costs than do mothers with no previous pregnancy experience; those with no pregnancy experience have children generating 14 percent lower costs, on average.

DISCUSSION

Eleven predictor variables (six medical and five sociodemographic) proved to be useful markers for identifying infants who subsequently required placement in kindergarten special education classrooms. Information about these risk factors is readily available on the birth certificate. Since many of these factors are known to be risks also for preschool developmental delay, it would be beneficial for physicians, educators, social workers, and policymakers to coordinate efforts in allocating resources for children with special needs.

Future Work

To improve the accuracy and scope of these cost estimates, we plan to make the following modifications to our core dataset: 1) add predictor variables whose presence will provide additional distal and proximal specification (e.g., maternal health problems, participation in the Women, Infants, Children (WIC) supplemental nutrition program, antenatal and postnatal steroid use, stress indicators from the Healthy Start Prenatal Risk Screening Instrument); and 2) extend the analysis of the base 1990-91 birth cohort through 4th grade, and follow two earlier birth cohorts into 5th grade. Only by estimating cumulative average percent change in costs associated with each predictor variable through elementary school will we be able to arrive at a clear picture of the full impact of birth conditions on special education costs.

REFERENCES

1. Lorenz JM. Survival of the extremely preterm infant in North America in the 1990s. *Clin Perinatol*. 2000;27:255-262.

2. Allen, MC. Developmental outcome of neonatal intensive care: what questions are we asking? *Curr Opin Pediatr*. 2000;12:116-122.

3. Committee on Fetus and Newborn. Postnatal corticosteroids to treat or prevent chronic lung disease in preterm infants. *Pediatrics*. 2002;109:330-338.

4. Dimitrou G, Greenough A, Broomfield D, Barnett C, Morton M. Rescue high frequency oscillation and predictors of adverse neurodevelopmental outcome in preterm infants. *Early Hum Dev*. 2002;66:133-141.

5. Clark RH, Kueeser TJ, Walker MW, Southgate WM, Huckaby JL, Peres JA, et al. Low dose nitric oxide therapy for persistent pulmonary hypertension of the newborn. *N Engl J Med*. 2000;342:469-74.

6. NIH Consensus Development Panel on the Effect of Corticosteroids for Fetal Maturation on Perinatal Outcomes. Effect of corticosteroids for fetal maturation on perinatal outcomes. *JAMA*. 1995;273:413-418.

7. Martin JA, Hamilton BE, Ventura SJ, Menacker F, Park MM. Births: Final data for 2000. *Nat Vital Stat Reports*. 2002;50(5):1-101.

8. Hack M, Klein NK, Taylor HG. Long-term developmental outcomes of low birth weight infants. *Future of Children*. 1995;5(1):176-196.

9. Chaikind S, Corman H. The impact of low birth weight on special education costs. *J Health Econ.* 1991;10:291-311.

10. Vohr BR, Dusick A, Steichen J, Wright LL, Verter J, Mele L. Neurodevelopmental and functional outcome of extremely low birth weight (ELBW) infants in National Institute of Child Health and Human Development Neonatal Research Network, 1993-1994. *Pediatrics*. 1999;105:1216-1226.

11. Parrish TB. Special education finance: Past, present and future. Palo Alto, CA: American Institutes of Research policy paper; 1996

12. Chambers JG. The patterns of expenditures on students with disabilities: A methodological and empirical analysis. In Parrish TB, Chambers JG, Guarino CM, eds. *Funding Special Education*. Thousand Oaks, CA: Corwin Press; 1999.

13. Cullen, JB, Figlio DN. How effective are intergovernmental incentives? Gainesville, FL: University of Florida, Department of Economics working paper; 2001.

14. Cullen JB. The incidence of special education mandates: Does the mainstream pay? Ann Arbor, MI: University of Michigan, Department of Economics working paper; 2001.

15. Resnick MB, Gueorguieva RV, Carter RL, Ariet M, Sun Y, Roth J, Bucciarelli RL, et al. The impact of low birth weight, perinatal conditions and sociodemographic factors on educational outcomes in kindergarten. *Pediatrics*. 1999;104,**e74.**

16. Lewit EM, Baker LS, Corman H, Shiono PH. The direct cost of low birth weight. *Future Children*. 1995;5(1):35-56.

17. Petrou S, Sach T, Davidson L. The long-term costs of preterm birth and low birth weight: results of a systematic review. *Child Care Health Dev*. 2001;27:97-115.

18. Stevenson RC, Pharoah PO, Stevenson CJ McCabe CJ, Cooke RW. Cost of care for a geographically determined population of low birth weight infants to age 8-9. II. Children with disability. *Arch Dis Child Fetal Neonatal Ed*. 1996;74;118-21.

19. Maddala GS. *Limited-dependent and qualitative variables in econometrics*. New York: Cambridge University Press;1983.

Table 1: Comparison of Merged and Total Vital Statistics Datasets

	Merged Data Set	Vital Statistics 1990-1991
Medicaid		
No	63.6%	69.8%
Yes	36.4%	30.2%
Birth Weight		
450-749	0.1%	0.5%
750-999	0.2%	0.3%
1000-1499	0.7%	0.7%
1500-2499	6.1%	6.0%
2500-2999	17.2%	16.5%
3000-4749	75.2%	75.5%
4750-6049	0.5%	0.5%
Congenital Anomaly		
Yes	1.3%	1.5%
None	98.7%	98.5%
Complications of Labor		
Yes	32.3%	32.6%
None	67.7%	67.4%
Race/Ethnicity		
Black	25.0%	21.7%
Hispanic	16.5%	16.2%
Others	1.4%	1.7%
White	57.1%	60.3%
Gender		
Male	51.6%	51.2%
Female	48.4%	48.8%
Maternal Age		
11-17	6.2%	5.3%
18-19	9.2%	8.3%
>=36	6.2%	6.9%
20-35	78.4%	79.5%

Table 1: Comparison of Merged and Total Vital Statistics Datasets (continued)

	Merged Data Set	Vital Statistics 1990-1991
Marital Status		
No	35.2%	31.9%
Yes	64.8%	68.1%
Maternal Education		
<HS	28.1%	24.7%
= HS	40.9%	38.6%
College	31.0%	36.7%
Prenatal Care		
None	2.3%	2.4%
Yes	97.7%	97.6%
Previous Pregnancy Experience		
Adverse	29.9%	29.4%
None	29.8%	31.9%
>=1	40.4%	38.7%

Table 2: Attributes of students generating different levels of costs in kindergarten

Attribute	Children generating no additional costs	Children costing between 101-300% of regular student	Children generating more than three times regular student's costs
Medicaid	35	46	51
School age poverty	56	66	70
Mother high school graduate, no college	41	40	39
Mother has some college	20	16	14
Mother college graduate	11	8	7
Mother had previous adverse pregnancy	30	30	31
Mother had no previous pregnancy experience	31	26	26
Mother married	65	60	58
Mother aged 11-17	6	8	8
Mother aged 18-19	9	11	13
Mother aged 36+	6	6	7
Male	49	66	70
Asian	1	1	1
Black	27	29	29
Hispanic	15	10	10
American Indian	0.2	0.2	0.2
Mixed-race	56	1	1
No prenatal care	2.2	3.2	4.3
1-4 prenatal visits	4.4	6.0	7.7
Congenital anomaly	1.2	2.0	3.6
Complications of labor or delivery	32	34	39
Extremely low birth weight	0.2	0.8	2.4
Very low birth weight	0.6	1.3	3.1
Low birth weight	5.8	8.1	12.1

Table 3: Ordered probit coefficient estimates of logarithmic costs during kindergarten (Clustering and heteroskedasticity-robust p-values in parentheses)

Predictor variable	Coefficient (p-value) Model I	Coefficient (p-value) Model II
Medicaid	.16 (p=.00)	.16 (p=.00)
School age poverty	.17 (p=.00)	.18 (p=.00)
Mother high school graduate, no college	-.13 (p=.00)	-.13 (p=.00)
Mother has some college	-.17 (p=.00)	-.17 (p=.00)
Mother college graduate	-.16 (p=.00)	-.16 (p=.00)
Mother had previous failed pregnancy	-.06 (p=.00)	-.05 (p=.00)
Mother had no previous pregnancy experience	-.15 (p=.00)	-.13 (p=.00)
Mother married	.03 (p=.08)	.02 (p=.15)
Mother aged 11-17	.01 (p=.69)	.01 (p=.66)
Mother aged 18-19	.02 (p=.21)	.02 (p=.25)
Mother aged 36+	.03 (p=.29)	.04 (p=.10)
Male	.39 (p=.00)	.39 (p=.00)
Asian	-.36 (p=.00)	-.35 (p=.00)
Black	-.19 (p=.00)	-.18 (p=.00)
Hispanic	-.37 (p=.00)	-.37 (p=.00)
American Indian	-.12 (p=.18)	-.14 (p=.11)
Mixed-race	-.25 (p=.00)	-.26 (p=.00)
No prenatal care	.14 (p=.00)	.18 (p=.00)
1-4 prenatal visits	.07 (p=.01)	.12 (p=.00)
Congenital anomaly	.32 (p=.00)	
Complications of labor or delivery	.05 (p=.01)	
Extremely low birth weight	.93 (p=.00)	
Very low birth weight	.58 (p=.00)	
Low birth weight	.24 (p=.00)	

Table 4: Implied average effects of each predictor variable (Model I, Table 3)

Predictor variable	Change in probability of appearing in each cost classification (just six lowest-cost classifications)						Implied average percentage change in costs associated with predictor variable
	lowest	2	3	4	5	6	
Medicaid	-.064	.034	.024	.002	.002	.002	15
School age poverty	-.069	.037	.026	.002	.002	.002	16
Mother high school graduate, no college	.050	-.022	-.022	-.002	-.002	-.002	-13
Mother has some college	.067	-.028	-.030	-.003	-.003	-.003	-17
Mother college graduate	.063	-.026	-.028	-.003	-.002	-.003	-16
Mother had previous failed pregnancy	.025	-.022	-.011	-.001	-.001	-.001	-6
Mother had no previous pregnancy experience	.057	-.015	-.025	-.002	-.002	-.003	-14
Mother married	-.010	.005	.004	.000	.000	.000	3
Mother aged 11-17	-.003	.002	.001	.000	.000	.000	1
Mother aged 18-19	-.010	.004	.004	.000	.000	.000	2
Mother aged 36+	-.010	.005	.004	.000	.000	.000	3
Male	-.154	.091	.051	.004	.003	.004	34
Asian	.135	-.046	-.066	-.007	-.007	-.009	-36
Black	.074	-.031	-.033	-.003	-.003	-.004	-19
Hispanic	.139	-.047	-.068	-.007	-.007	-.009	-37
American Indian	.047	-.021	-.020	-.002	-.002	-.002	-12
Mixed-race	.097	-.037	-.045	-.005	-.004	-.005	-25
No prenatal care	-.055	.029	.021	.002	.002	.002	13
1-4 prenatal visits	-.030	.015	.012	.001	.001	.001	7
Congenital anomaly	-.127	.073	.044	.003	.003	.003	29
Complications of labor or delivery	-.020	.010	.008	.001	.001	.001	5
Extremely low birth weight	-.341	.236	.089	.006	.005	.005	71
Very low birth weight	-.227	.143	.069	.005	.004	.004	49
Low birth weight	-.094	.052	.034	.002	.002	.002	22

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