Does Managed Care Widen Infant Health Disparities? Evidence from Texas Medicaid ONLINE APPENDIX

Ilyana Kuziemko, Katherine Meckel, and Maya Rossin-Slater*

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A Model

A.1 Modeling incentives in MMC versus FFS

Consider two types of patients, healthy (H) and sick (S). Patient types are fixed over time. There are two types of costs that plans incur: those associated with preventive care θ (defined broadly; in our context it could include factors like the number of pre-natal visits and the quality of the hospital at which the mother will deliver) and those associated with outcomes $c_i(\theta)$, where c varies by patient type.[1] For simplicity, let $c_H(\theta) = c(\theta)$ and $c_S(\theta) = c(\theta) + \alpha$, with $c' < 0$ and $c'' > 0$, so the returns to care are the same across patient type (as in Glazer and McGuire, 2000).

Incentives in MMC. Under MMC, there are at least two plans from which patients can choose. Plans receive a capitation payment p regardless of patient type. Plans face a dynamic problem—how they treat a patient today determines whether she will return in the next period.[2] Let $\lambda(\theta)$ be the probability a patient choses the same plan in the next period, which is increasing concavely in the care she receives in the current period, so $\lambda' > 0$ and $\lambda'' < 0$. (In fact, in Texas, Medicaid recipients can change plans in the middle of a pregnancy, though we were unable to determine how frequently such a transition occurs.) We scale down this probability by a discount factor δ to reflect the fact that she may exit

*Kuziemko: Princeton University, NBER, 322 Wallace Hall, Princeton, NJ 08544, kuziemko@princeton.edu. Meckel: University of California at Los Angeles, 8283 Bunche Hall, Los Angeles, CA 90095, kmeckel@econ.ucla.edu. Rossin-Slater: Stanford University, NBER, and IZA, 259 Campus Drive, Redwood Building T101C, Stanford, CA 94305, mrossin@stanford.edu.

[1] As both these costs are direct functions of θ we could instead formulate the model in terms of a total cost function, but splitting costs in this manner aids with intuition and maps more closely to the empirical results. Note also that we do not distinguish between mothers and infants and combine costs for both (as shown earlier, empirically all variation in this sum cost is driven by costs related to the infant).

[2] In our MMC context, "returning the next period" can either mean that the mother continues using this plan for the infant's later health care needs or that she returns to this plan the next time she is pregnant (and thus eligible for Medicaid herself).

the Medicaid program (e.g., no longer meet the income test) and to ensure a finite stream of expected profits.

We assume that plans can quickly learn patient type after a mother enrolls. First, they might form a reasonable estimate based on basic observables such as age and race. Second, in an initial check-up, information such as BMI, blood pressure, and health history will be gained. Third, diagnostic procedures throughout the pregnancy may reveal even more detailed information. We thus assume that patient type is observable to the plan at the point they are making many of their decisions about approving care θ.

Knowing patient type, each plan solves the following dynamic maximization problems:

$$V_t^H = \max_\theta \left\{ p - \theta - c(\theta) + \delta\lambda(\theta)V_{t+1}^H \right\} \quad [Healthy]$$

$$V_t^S = \max_\theta \left\{ p - \theta - c(\theta) - \alpha + \delta\lambda(\theta)V_{t+1}^S \right\} \quad [Sick]$$

Because for all θ, $p - \theta - c(\theta)$, the flow payoff from covering type H, is greater than $p - \theta - c(\theta) - \alpha$, the flow payoffs of covering type S, it holds that $V_{t+1}^H > V_{t+1}^S$. While the first-best merely equates the marginal cost of θ (normalized to one) and its marginal benefits (i.e., $1 = -c'(\theta)$, so identical levels of care for both types), differentiating each of the above expressions with respect to θ yields the following first-order conditions for MMC plans:

$$1 = -c'(\theta) + \delta\lambda'(\theta)V_{t+1}^H \quad [Healthy]$$

$$1 = -c'(\theta) + \delta\lambda'(\theta)V_{t+1}^S \quad [Sick].$$

For healthy patients, plans equate the marginal cost of an additional unit of θ (one) against two marginal benefits: that increasing θ decreases outcome costs (i.e., $-c'(\theta)$) while increasing the probability that the plan will enjoy the expected future profit stream (i.e., $\delta\lambda'(\theta)V_{t+1}^H$). For sick patients, the incentives are the same, except that the continuation payoff $\delta\lambda'(\theta)V_{t+1}^S$ is smaller than that associated with a healthy patient, or perhaps negative. Either way, $V_{t+1}^H > V_{t+1}^S$ and $c'' > 0$ and $\lambda'' < 0$, so it must be that $\theta_H^{MMC*} > \theta_S^{MMC*}$.

Incentives under FFS. For simplicity, we model providers under FFS as being completely indifferent to outcome costs c_i; they merely send the bills back to the state. We assume that FFS providers get paid some reimbursement rate ρ for θ, and their cost of effort (or opportunity cost) is $e(\theta)$, which is increasing convexly in θ. Thus, for each client, they provide some standard amount of care that satisfies $\rho = e'(\theta)$, and so $\theta_H^{FFS*} = \theta_S^{FFS*}$.

Predictions. The key result of the model is a divergence of health resources θ for healthy and sick groups under MMC relative to FFS. That is:

$$(\theta_H^{MMC*} - \theta_H^{FFS*}) > (\theta_S^{MMC*} - \theta_S^{FFS*}).$$

Assuming that health inputs have the expected effect on health outcomes, we predict the same divergence in outcomes after the switch from FFS to MMC—outcomes for healthy clients improve *relative* to those for sick clients.

Additionally, this model implicitly predicts that the effective price of childbearing increases for high-cost groups, while decreasing for low-cost groups. As such, the switch to

MMC can affect birth composition as the groups whose care diminishes under MMC may lower their fertility (either through lower conception rates or higher abortion rates) in response. Albanesi and Olivetti (2010) offer evidence that improved health care for pregnant women during the 1950s contributed to the Baby Boom.[3] Moreover, if the continuation probability λ is not very responsive to quality of care θ and thus mothers' inertia is high, then plans might differentially encourage birth control (which is covered under Medicaid) for high-cost mothers.

Extending the model to initial enrollment. low-riskThe model abstracts from how individuals initially select their plans, and instead focuses on their decisions to continue in them. While beyond the scope of this paper, available evidence suggests that "word-of-mouth" from friends and family play a large role in plan selection, and thus λ in our model may be modified to include not only the probability a patient returns but also that she recommends the plan to others in her social network.[4] Given that race and ethnicity are excellent proxies of expected health costs in Texas, plans should aim to create a positive "word-of-mouth" among Hispanic clients (assuming that most individuals' friends are family are from their own race/ethnicity). As such, concerns about reputation may lead plans to also improve the care of individual high-cost members (e.g., high-risk Hispanic mothers) that come from low-cost groups.

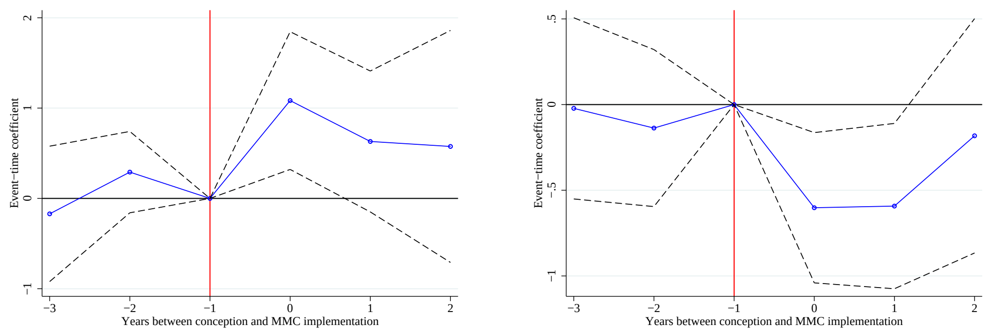
B Appendix figures and tables

[3] There is a small literature on whether Medicaid itself or similar programs that provide pre- or post-natal care are pro-natalist. As discussed by Lopoo and Raissian (2012), as Medicaid has generally provided both enhanced coverage for the costs related to child birth *as well as* access to birth control, it is hard to separate whether the enhanced coverage alone would be pro-natalist.

[4] Edgman-Levitan and Cleary (1996) document that seniors value word-of-mouth recommendations from friends and family more than they do aggregate "report card"-type ratings in choosing a managed care plan. Isaacs (1996) surveys adults of all ages and finds that family and friends' recommendations are weighed nearly the same as a *doctor's* recommendation in choosing a plan.

Figure B1: Changes in pre-term birth rates (×100) of children born to U.S.-born black and Hispanic mothers (note different scales)

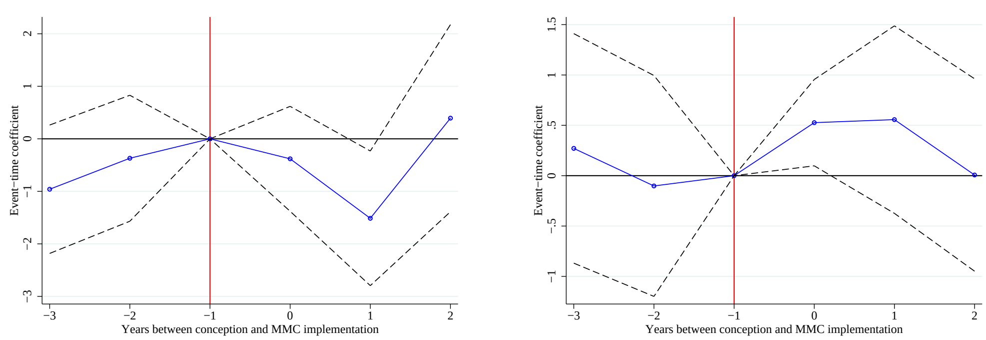
(a) Blacks (b) Hispanics



Notes: These figures show the results from estimating the effects on preterm birth rates for black (Figure a) and Hispanic (Figure b) births in the 3 years before and after MMC implementation. See the notes to Figure 2 for further details on the estimation procedure.

Figure B2: Changes in the male share of births (×100) born to U.S.-born black and Hispanic mothers (note different scales)

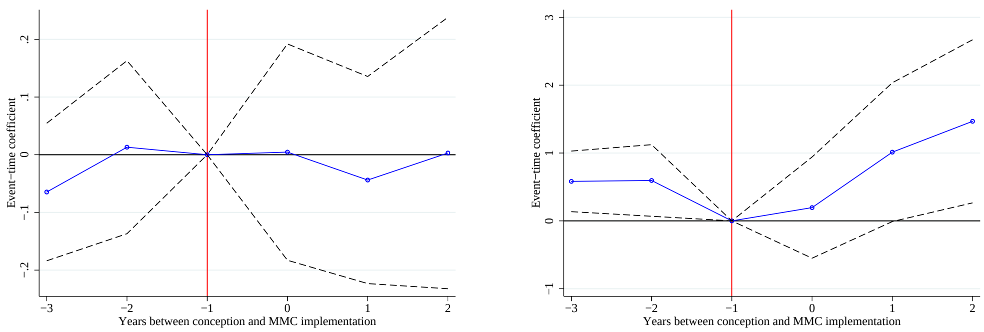
(a) Blacks (b) Hispanics



Notes: These figures show the results from estimating the effects on share male births for black (Figure a) and Hispanic (Figure b) births in the 3 years before and after MMC implementation. See the notes to Figure 2 for further details on the estimation procedure.

Figure B3: Changes in mortality rates and pre-term birth rates (×100) of children born to foreign-born Hispanic mothers (note different scales)

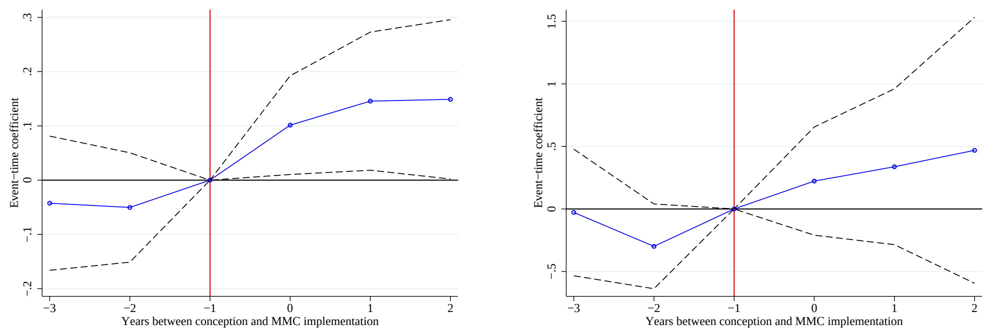
(a) Mortality (b) Pre-term



Notes: This figure shows the results from estimating the effects on the mortality rate (a) and pre-term rate (b) for children of foreign-born Hispanic mothers in the 3 years before and after MMC implementation. See the notes to Figure 2 for further details on the estimation procedure.

Figure B4: Changes in mortality rates and pre-term birth rates (×100) of children born to married non-Hispanic white mothers (note different scales)

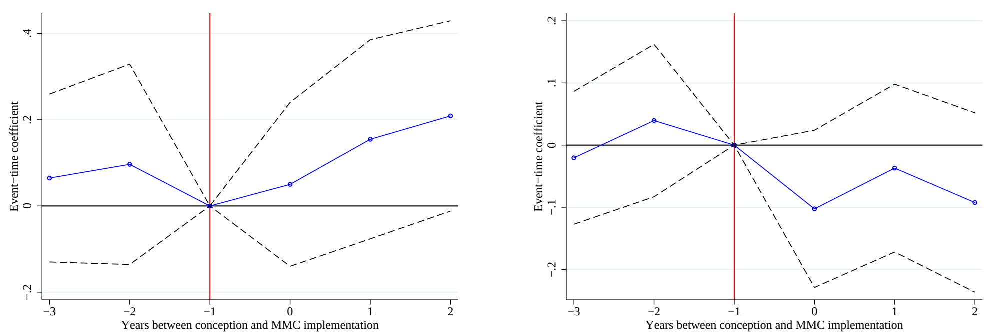
(a) Mortality (b) Pre-term



Notes: This figure shows the results from estimating the effects on the mortality rate (a) and pre-term rate (b) for children of married non-Hispanic white mothers in the 3 years before and after MMC implementation. See the notes to Figure 2 for further details on the estimation procedure.

Figure B5: Changes in mortality rates (×100) of children born to U.S.-born black and Hispanic mothers (note different scales), no county trends

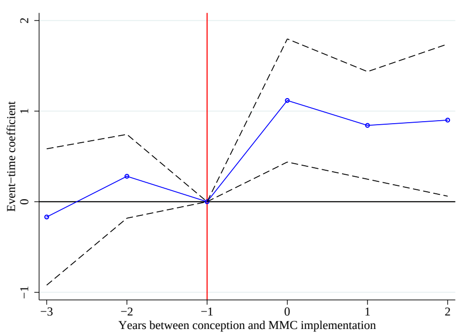
(a) Blacks (b) Hispanics



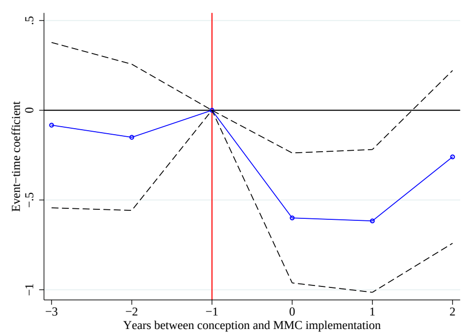
Notes: These figures show the results from estimating the effects on mortality rates for black (Figure a) and Hispanic (Figure b) births in the 3 years before and after MMC implementation. The event-study regressions underlying these graphs do *not* include county-specific trends. See the notes to Figure 2 for further details on the estimation procedure.

Figure B6: Changes in pre-term birth rates (×100) of children born to U.S.-born black and Hispanic mothers (note different scales), no county trends

(a) Blacks



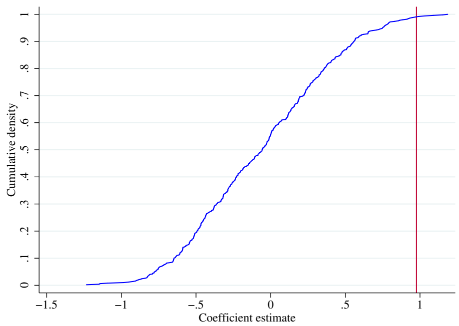
(b) Hispanics



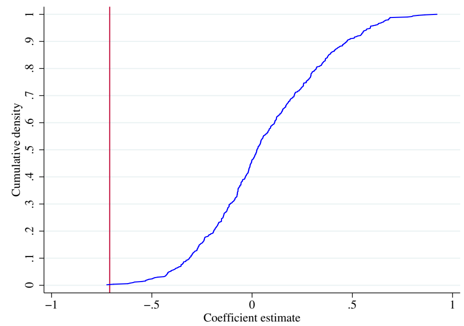
Notes: These figures show the results from estimating the effects on preterm birth rates for black (Figure a) and Hispanic (Figure b) births in the 3 years before and after MMC implementation. The event-study regressions underlying these graphs do *not* include county-specific trends. See the notes to Figure 2 for further details on the estimation procedure.

Figure B7: Permutation test: Cumulative density functions of coefficient estimates for share pre-term from 500 random draws of placebo treatment assignment

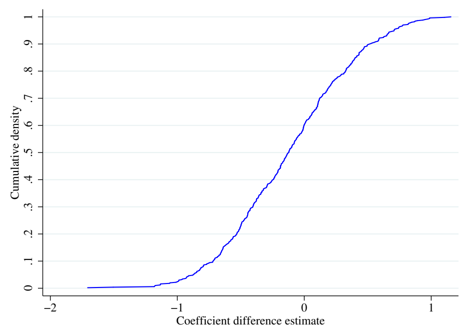
(a) Blacks



(b) Hispanics



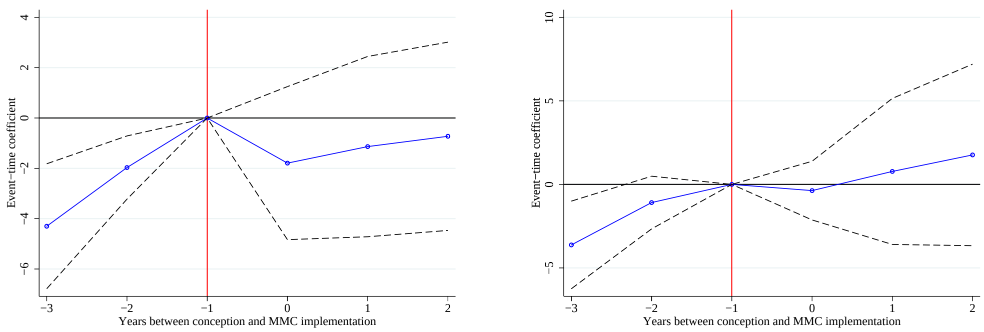
(c) Black minus Hispanic



Notes: These figures show the cumulative density functions that come from a permutation test in which, in every iteration, each "switcher county" is randomly assigned an implementation date (we exclude the six months before and after the true implementation) instead of the true implementation date. The graphs show the cdfs generated by 500 draws. The red vertical lines show the location of the true coefficients for share pre-term for U.S.-born blacks (in Figure a), Hispanics (in Figure b), and the black-Hispanic difference (Figure c).

Figure B8: Changes in the share of mothers initiating pre-natal care in the 1st month of pregnancy (×100) among U.S.-born black and Hispanic mothers (note different scales)

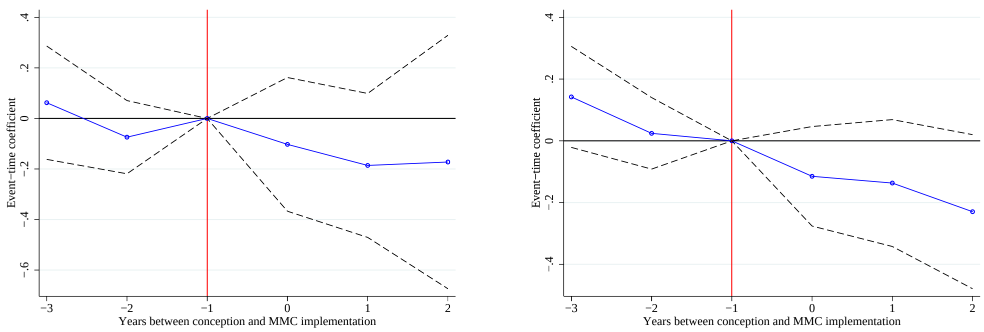
(a) Blacks (b) Hispanics



Notes: These figures show the results from estimating the effects on the share of mothers initiating pre-natal care in the first month of pregnancy for black (Figure a) and Hispanic (Figure b) births in the 3 years before and after MMC implementation. See the notes to Figure 2 for further details on the estimation procedure.

Figure B9: Changes in the average number of pre-natal care visits among U.S.-born black and Hispanic mothers (note different scales)

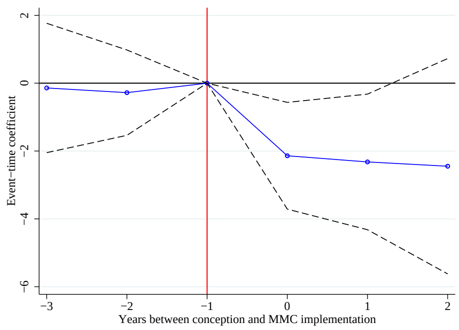
(a) Blacks (b) Hispanics



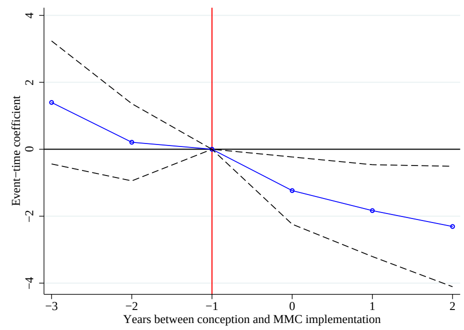
Notes: These figures show the results from estimating the effects on the average number of pre-natal care visits for black (Figure a) and Hispanic (Figure b) births in the 3 years before and after MMC implementation. See the notes to Figure 2 for further details on the estimation procedure.

Figure B10: Changes in the share of mothers receiving more than 7 pre-natal care visits (×100) among U.S.-born black and Hispanic mothers (note different scales)

(a) Blacks



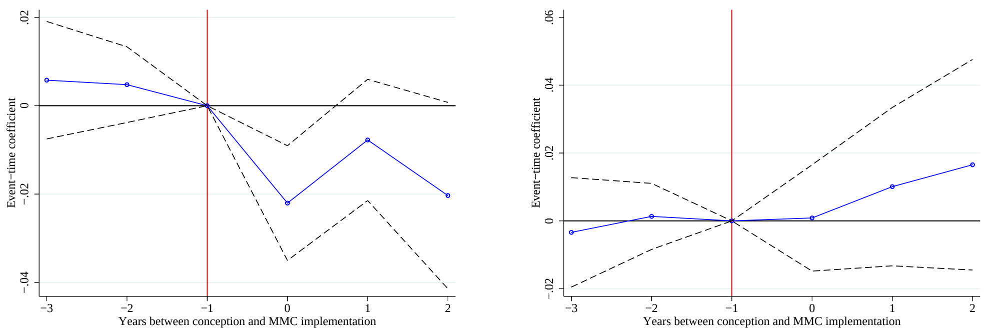
(b) Hispanics



Notes: These figures show the results from estimating the effects on the share of mothers receiving more than 7 pre-natal care visits for black (Figure a) and Hispanic (Figure b) births in the 3 years before and after MMC implementation. See the notes to Figure 2 for further details on the estimation procedure.

Figure B11: Changes in the share of mothers gaining at least 15 pounds during pregnancy (×100) among U.S.-born black and Hispanic mothers (note different scales)

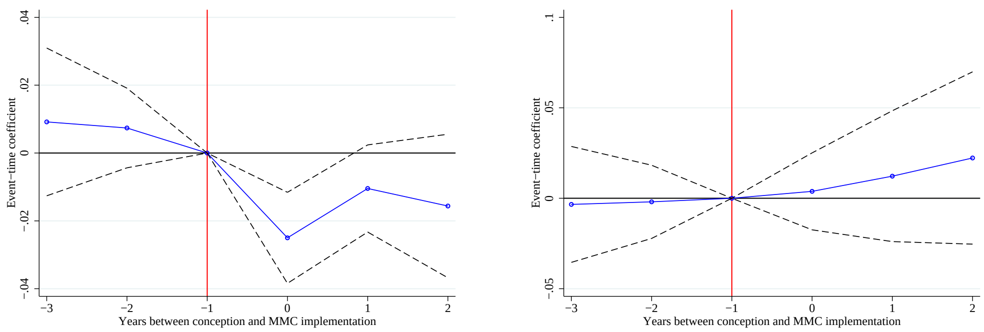
(a) Blacks (b) Hispanics



Notes: These figures show the results from estimating the effects on the share of mothers who gained at least 15 pounds during pregnancy for black (Figure a) and Hispanic (Figure b) births in the 3 years before and after MMC implementation. See the notes to Figure 2 for further details on the estimation procedure.

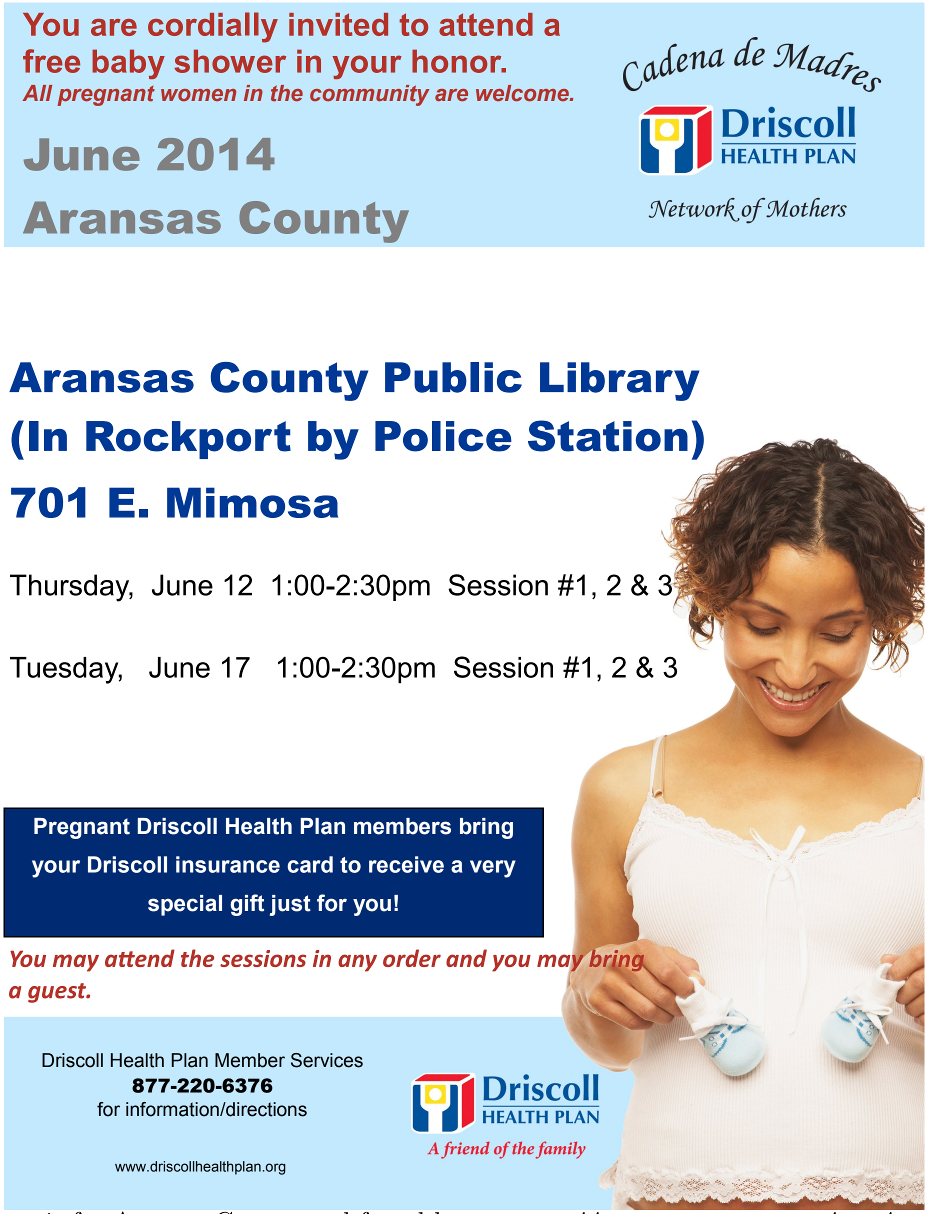
Figure B12: Changes in the share of mothers gaining at least 20 pounds during pregnancy (×100) among U.S.-born black and Hispanic mothers (note different scales)

(a) Blacks (b) Hispanics



Notes: These figures show the results from estimating the effects on the share of mothers who gained at least 20 pounds during pregnancy for black (Figure a) and Hispanic (Figure b) births in the 3 years before and after MMC implementation. See the notes to Figure 2 for further details on the estimation procedure.

Figure B13: Driscoll's "Cadena De Madres" Flyer



Notes: This flyer is for Aransas County and found here: `http://www.dchpkids.com/pdf/AransasInvite.pdf`. All flyers and other information on Cadena de Madres is found here: `http://www.dchpkids.com/services/?location=cadena_de_madres`. Note that the class is open to all pregnant women, but it is only free for those in Driscoll's MMC plan (called "Driscoll Health Plan"). Driscoll Health Plan members also receive a special gift for attending, as advertised.

Appendix Table B1: Roll Out Schedule for Texas MMC

Date	Counties
Aug 1993	Travis
Dec 1993	Chambers Jefferson Galveston
Dec 1995	Liberty, Hardin, Orange
Sep 1996	Burnet Williamson Lee Bastrop Fayette Caldwell
	Hays Lubbock Terry Lynn Garza Crosby Hockley Llano Hale
	Floyd Swisher Randall Deaf Smith Potter Hutshinson Carson
	Bexar Atascosa Wilson Guadalupe Comal Kendall Bandera
	Medina Tarrant Hood Parker Wise Denton Johnson
Dec 1997	Houston
Mar 1998	Harris Galveston Brazoria Matagorda Wharton Fort Bend
	Austin Waller Montgomery
Jan 1999	Dallas Ellis Navarro Kaufman Rockwall Hunt Collin El Paso
	Hudspeth
Jan 2006	Nueces Kenedy Brooks Kleberg Jim Wells San Patricio
	Live Oak Aransas Refugio Bee Goliad Victoria Karnes Calhoun

Notes: This information was obtained from Chapter 6 of the report available here: `www.hhsc.state.tx.us/medicaid/reports/PB8/PinkBookTOC.html`

Appendix Table B2: Is the MMC rollout correlated with underlying county trends?

	Log Pop.		Log Inc./Cap.		Log Transf./Cap.		Unemp. Rate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
After MMC	0.0256*	0.00201	0.0300***	-0.00428	-0.0119**	-0.00215	0.00946*	0.000278
	[0.0133]	[0.00206]	[0.00883]	[0.00394]	[0.00524]	[0.00334]	[0.00560]	[0.00367]
Mean, dept. var	1.538	1.538	0.829	0.829	-1.287	-1.287	0.0613	0.0613
Reg. obs. (cells)	26021	26021	26021	26021	26021	26021	26021	26021
Underlying births	2814681	2814681	2814681	2814681	2814681	2814681	2814681	2814681
Time Trends	No	Yes	No	Yes	No	Yes	No	Yes

Notes: See notes to Table 3 for details about the data, sample and specification. Regressions include county and year×month fixed effects. County linear time trends are included only in even columns. We use county-year data on per capita income, per capita transfers and population from the Regional Economic Information System (REIS), and unemployment data from the Local Area Unemployment Statistics (LAUS) of the Bureau of Labor Statistics. We interpolate to create monthly measures to avoid sharp jumps at the end of calendar years.

Appendix Table B3: Hospital charges for newborns and deliveries (including hospital fixed effects)

	Newborn	Delivery		Newborn	
	(1)	(2)	(3)	(4)	(5)
Black	3026.1***	866.7***	882.0***		
	[117.3]	[15.72]	[15.72]		
Died				75399.9***	56471.4***
				[4598.4]	[1795.0]
Mean, dept. var.	5813.6	7107.5	7107.5	10085.4	6274.2
Mean, ex. group	5236.6	7002.9	7002.9	9621.5	6092.8
Pct. diff	0.578	0.124	0.126	7.837	9.269
Age cat. FE	No	No	Yes	No	No
Sample	Bl., H.	Bl., H.	Bl., H	B.	H.
Observations	816914	788637	788637	34782	148542

Notes: Regressions are based on data from public-use Texas Hospital discharge data (see `http://www.dshs.state.tx.us/THCIC/Hospitals/Download.shtm` to download these data). All regressions include county and year fixed effects and include all Hispanic and black births from the third quarter of 2000 through 2004 (charges are suppressed before 2000:Q3). Col. (3) includes maternal age fixed effects ($age < 20, age \in [20, 25), age \in [25, 30), age \in [30, 35), age \geq 35$). All means of the dependent variable are reported, as well as the percent difference between the group denoted by the reported regression coefficient (e.g., blacks, in col. 1) and the excluded group (e.g., Hispanics, in col. 1). That is, "Pct. Diff" just divides the coefficient by the excluded-group mean. Cols. (1) through (3) include all blacks and Hispanics, col. (4) includes only blacks and col. (5) includes only Hispanics.

Appendix Table B4: Estimated Medicaid share of births in 2005

	(1) All	(2) U.S. Bl.	(3) U.S. Hisp	(4) For. Bl.	(5) For. Hsp.	(6) Wh.
Medicaid share	0.539	0.836	0.877	0.338	0.271	0.437
Medicaid share, married	0.360	0.471	0.692	0.245	0.265	0.269
Observations	273,471	26,615	69,146	2,647	64,610	100,526

Notes: Texas does not record Medicaid status on birth certificates until 2005. As we discuss in Section II, these numbers appear substantially under-reported, likely due to women or providers who are on privatized Medicaid mistakenly reporting that the birth is covered by a private or "other" instead of Medicaid. For example, comparing conceptions from 2004-2005 to those in 2007-2008 in the counties that switched to MMC in 2006, the reported Medicaid share falls from 64.7 percent to 49.9 percent (it did not fall in other counties). This drop suggests that the true Medicaid share is roughly 1.3 times (64.7/49.9) the reported share in the post-period. Similarly, in 2005, the official count of Medicaid births from the Texas DHHS is 1.3 times the count in the birth certificate data. See `http://www.hhsc.state.tx.us/medicaid/reports/PB8/PDF/Chp-4.pdf`, p. 4-15. The official count indicates that 54 percent of births are covered by Medicaid, whereas our birth certificate data indicate 41 percent. We thus "gross up" the Medicaid share by 1.3 in this table

Appendix Table B5: Effect of MMC on mortality and birth outcomes ($\times 100$) for U.S.-born vs. foreign-born black births

	Mort.		Pret.		LBW		Abn. BW		Male	
	(1) Nat.	(2) For.	(3) Nat.	(4) For.	(5) Nat.	(6) For.	(7) Nat.	(8) For.	(9) Nat.	(10) For.
Conceived after MMC	0.179**	0.200	0.976***	-0.643	0.730*	-0.500	0.849**	0.679	-0.00762*	0.0152
	[0.0786]	[0.347]	[0.336]	[0.778]	[0.380]	[0.728]	[0.360]	[1.441]	[0.00428]	[0.0107]
Dept. var mean	1.198	1.355	13.51	11.38	12.72	9.831	17.25	19.20	0.509	0.505
Diff/p-val	-0.0203	0.894	1.619	0.000000521	1.231	0.00178	0.171	0.777	-0.0228	0.0000901
Reg. obs (cells)	12833	2387	12833	2387	12828	2381	12828	2381	12833	2387
Indiv. obs.	296589	21555	296589	21555	296584	21549	296584	21549	296589	21555

Notes: See notes under Table 3 for more details about the data, sample, and specifications. The odd-numbered columns present results for children of U.S.-born black mothers (same as in the main results in Tables 3 and 4), while the even-numbered columns present results for children of foreign-born black mothers. "LBW" denotes birth weight $< 2,500$g; "Abn. BW" (abnormal birthweight) denotes birthweight $< 2,500$g or $> 4,000$g; "Pre-term" denotes gestation < 37 weeks. "Male" refers to the sex of the infant.

Appendix Table B6: Correlation between MMC and foreign-born black and Hispanic birth rates

	Foreign-Born Black		Foreign-Born Hisp.	
	(1) Share of births	(2) Log births	(3) Share of births	(4) Log births
Conceived after MMC	-0.000639* [0.000326]	-0.0559 [0.0334]	-0.00291 [0.00222]	-0.0313 [0.0240]
Mean, dept. var.	0.00766	3.826	0.219	6.030
Reg. obs. (cells)	26021	648	26021	6156
Indiv. obs.	2814681	18712	2814681	585721

Notes: See notes to Table 3 for details about the data, sample and specification. When logs are used in columns (2) and (4), counties are restricted to those with at least one birth to black foreign-born (in column 2) and to Hispanic foreign-born (in column 4) women (to avoid taking the log of zero and to have a consistent sample of counties. Columns (1) and (3) are weighted by the total number of births in each county/year/month, while columns (2) and (4) are weighted by the number of foreign-born black (foreign-born Hispanic) births in each county/year/month.

Appendix Table B7: Effect of MMC on birth outcomes ($\times$100) for married white mothers

	(1) Mort.	(2) Pret	(3) LBW	(4) ABW	(5) Male	(6) Older
Conceived after MMC	0.0779* [0.0408]	0.367* [0.190]	0.0438 [0.120]	-0.0215 [0.179]	-0.234 [0.209]	0.109 [0.193]
Mean, dept. var	0.614	8.589	5.991	17.44	51.27	11.45
Reg. obs. (cells)	23898	23898	23894	23894	23898	23898
Underlying	922142	922142	922138	922138	922142	922142

Notes: See notes under Table 3 for more details about the data, sample, and specifications. "LBW" denotes birth weight $< 2,500$g; "Abn. BW" (abnormal birthweight) denotes birthweight $< 2,500$g or $> 4,000$g; "Pre-term" denotes gestation < 37 weeks. "Older" denotes the share of mothers 35 and above. "Male" refers to the sex of the infant.

Appendix Table B8: Effect of MMC on mortality rates (×100), additional county×year controls

	(1) Bl.	(2) Hsp.	(3) Bl.	(4) Hsp.	(5) Bl.	(6) Hsp.
Conceived after MMC	0.188*** [0.0696]	-0.155* [0.0832]	0.164** [0.0833]	-0.162** [0.0708]	0.267** [0.120]	-0.149* [0.0822]
Log Population			-3.560 [5.041]	-4.918** [2.298]	-7.725 [6.626]	-5.216 [3.625]
Log Income Per-Capita			3.710* [1.954]	-1.459** [0.650]	6.867*** [2.619]	-0.634 [1.184]
Log Transfer Per Capita			-5.718** [2.834]	1.603 [1.448]	-7.398** [3.178]	0.187 [2.545]
Unemployment Rate			3.034 [6.458]	-2.566* [1.466]	1.870 [7.346]	-0.895 [2.549]
Emp to Pop Rate			381.6 [568.9]	-317.3 [306.4]	611.4 [816.3]	-79.73 [491.5]
Log Annual Cnty Profits			-0.640 [1.031]	0.182 [0.512]	-0.839 [1.452]	-0.128 [0.808]
Log Total Cnty Estab's			2.330 [2.146]	0.851 [0.995]	0.972 [2.635]	-0.882 [2.072]
Death Rate 65+			-6.037 [16.02]	3.651 [3.237]	-3.516 [22.79]	1.504 [4.823]
Dept. var mean	1.197	0.714	1.197	0.714	1.260	0.821
Sample	All	All	All	All	Unmar.	Unmar.
Diff/p-val	0.343	0.00224	0.326	0.00183	0.416	0.00533
Reg. obs (cells)	12784	19665	12784	19665	11733	15920
Indiv. obs.	296537	644534	296537	644534	190863	249557

Notes: See notes under Table 3 for more details about the data, sample, and specifications. The additional controls include: the employment-to-population ratio, log annual firm profits, log total number of establishments, and the elderly death rate. The data on firm profits and the number of establishments comes from the County Business Patterns (CBP), while the data on the elderly death rate is from the National Center for Health Statistics (NCHS). For ease of interpretation of the coefficients, we re-scale the county controls as follows (before taking the log): per capita income is divided by 10,000; unemployment rate is divided by 100; population is divided by 100,000; transfers per capita are divided by 10,000; employment per population is divided by 100; annual profits are divided by 10,000; and establishments are divided by 100. $^{*}p < 0.1,^{**} p < 0.05,^{***} p < .01$

Appendix Table B9: Effect of MMC on mortality rates (×100), different time trends

	(1) Bl.	(2) Hsp.	(3) Bl.	(4) Hsp.	(5) Bl.	(6) Hsp.
Conceived After MMC	0.0683	-0.0755	0.179**	-0.154**	0.183**	-0.146**
	[0.0739]	[0.0486]	[0.0786]	[0.0749]	[0.0804]	[0.0634]
Log Population	-1.036	-0.116	-3.140	-4.784**	-5.850	-6.058**
	[0.707]	[0.407]	[4.685]	[2.161]	[6.177]	[2.916]
Log Income Per-Capita	-0.996	-0.700	3.342*	-1.129*	3.584*	-1.342**
	[0.911]	[0.474]	[1.932]	[0.642]	[2.012]	[0.641]
Log Transfer Per Capita	-3.093**	-1.480**	-5.392*	1.582	-7.866**	1.116
	[1.297]	[0.663]	[2.750]	[1.394]	[3.329]	[1.786]
Unemployment Rate	0.791	1.219	1.851	-1.685	8.411	-0.739
	[5.142]	[0.868]	[5.957]	[1.489]	[8.267]	[1.409]
Dept. var mean	1.198	0.715	1.198	0.715	1.198	0.715
Sample	All	All	All	All	All	All
Diff/p-val	0.144	0.0371	0.333	0.00237	0.328	0.000977
Reg. obs (cells)	12833	20504	12833	20504	12833	20504
Indiv. obs.	296589	646053	296589	646053	296589	646053
County Trends	None	None	Linear	Linear	Quad.	Quad.

Notes: See notes under Table 3 for more details about the data, sample, and specifications. Columns (1) and (2) do not include time trends; columns (3) and (4) include county linear time trends (our baseline specification); columns (5) and (6) include county quadratic time trends. $^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < .01$

Appendix Table B10: Changes in risk-factors (×100) after MMC for U.S.-born black and Hispanic mothers

	Older		Diab/Hyper		Smokes		Pred. Mort.	
	(1) Bl.	(2) Hsp.	(3) Bl.	(4) Hsp.	(5) Bl.	(6) Hsp.	(7) Bl.	(8) Hsp
Conceived after MMC	-0.460**	-0.298**	-0.0840	-0.237	-0.286	0.278	-0.00899***	-0.000697
	[0.179]	[0.140]	[0.193]	[0.217]	[0.303]	[0.202]	[0.00283]	[0.00135]
Dept. var mean	5.659	4.699	3.469	3.164	6.284	3.483	1.182	0.708
Diff/p-val	-0.162	0.421	0.153	0.530	-0.564	0.0287	-0.00829	0.00631
Reg. obs (cells)	12832	20504	12833	20504	12808	20489	12801	20471
Indiv. obs.	296588	646053	296589	646053	296563	646037	296556	646019

Notes: See notes under Table 3 for more details about the data, sample, and specifications. “Older” denotes the share of mothers age 35 and above. “Diab/Hyper.” denotes the share of mothers with diabetes or hypertension. “Smokes” denotes the share of mothers who reported smoking during pregnancy. “Predicted Mortality” is the proportion of infant mortality predicted by the following pre-existing risk variables: maternal age, maternal education, and infant parity indicators, as well as all interactions between the maternal education and maternal age indicators and all interactions between infant parity and maternal age indicators.

Appendix Table B11: Effect of MMC on U.S.-born black birth outcomes (×100) after controlling for covariates

	(1) Mort.	(2) Pret.	(3) LBW	(4) ABW	(5) Male
Conceived after MMC	0.185**	1.004***	0.817**	0.924***	-0.759*
	[0.0773]	[0.327]	[0.376]	[0.350]	[0.418]
Dept. var mean	1.198	13.51	12.72	17.25	50.95
Indiv. obs.	296589	296589	296279	296279	296589

Notes: These regressions are based on individual-level Texas birth records data. The sample of analysis includes births that were conceived by mothers residing in Texas between January 1993 and December 2001. All regressions include the typical controls in the cell-aggregated regressions (county and year×month fixed effects, county linear time trends, and controls for log population, log per capita income, log per capita transfers, and the unemployment rate) as well as the following individual-level controls: indicators for married and first-parity child, age (in four-year bins) fixed effects, and educational attainment fixed effects (no high school education, high school education, some college and college graduate). Standard errors are clustered by county. "LBW" denotes birth weight $< 2,500$g; "ABW" (abnormal birthweight) denotes birthweight $< 2,500$g or $> 4,000$g; "Pret." (pre-term) denotes gestation < 37 weeks. "Male" refers to the sex of the infant. $^{*}p < 0.1,^{**} p < 0.05,^{***} p < .01$

Appendix Table B12: Effect of MMC on U.S.-born Hispanic birth outcomes (×100) after controlling for covariates

	(1) Mort.	(2) Pret.	(3) LBW	(4) ABW	(5) Male
Conceived after MMC	-0.151**	-0.679***	0.0127	-0.129	0.782***
	[0.0744]	[0.190]	[0.156]	[0.349]	[0.244]
Dept. var mean	0.715	9.593	7.334	14.21	51.04
Indiv. obs.	646053	646053	645778	645778	646053

Notes: These regressions are based on individual-level Texas birth records data. The sample of analysis includes births that were conceived by mothers residing in Texas between January 1993 and December 2001. All regressions include the typical controls in the cell-aggregated regressions (county and year×month fixed effects, county linear time trends, and controls for log population, log per capita income, log per capita transfers, and the unemployment rate) as well as the following individual-level controls: indicators for married and first-parity child, age (in four-year bins) fixed effects, and educational attainment fixed effects (no high school education, high school education, some college and college graduate). Standard errors are clustered by county. "LBW" denotes birth weight $< 2,500$g; "ABW" (abnormal birthweight) denotes birthweight $< 2,500$g or $> 4,000$g; "Pret." (pre-term) denotes gestation < 37 weeks. "Male" refers to the sex of the infant. $^{*}p < 0.1,^{**} p < 0.05,^{***} p < .01$

Appendix Table B13: Effect of MMC on mortality (×100) for U.S.-born black and Hispanic births, controlling for pre-term and low-birth-weight

	Baseline		Control Pret/LBW	
	(1)	(2)	(3)	(4)
	Bl.	Hsp.	Bl.	Hsp.
Conceived after MMC	0.179**	-0.154**	0.0952	-0.139**
	[0.0770]	[0.0738]	[0.0603]	[0.0560]
Dept. var mean	1.198	0.715	1.139	0.697
Indiv. obs.	296589	646053	296279	645778

Notes: These regressions are based on individual-level Texas birth records data. The sample of analysis includes births that were conceived by mothers residing in Texas between January 1993 and December 2001. All regressions include the typical controls in the cell-aggregated regressions (county and year×month fixed effects, county linear time trends, and controls for log population, log per capita income, log per capita transfers, and the unemployment rate). Columns (3) and (4) also include a full set of dummy variables for birth weight in 250 gram bins and weeks of gestation, and the interactions between them. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < .01$

Appendix Table B14: MMC Plans, Racial Composition, and Extra Services

Plan Name	Service Areas	Black Population, 2010 Census	Hispanic Population, 2010 Census	Black/Hispanic	Link to Value Added Services
Aetna	Bexar and Tarrant	480,774	1,795,499	0.2678	www.aetnabetterhealth.com/texas/members/medicaid/value-adds
Amerigroup	Bexar, Dallas, Harris, Jefferson, Lubbock, Tarrant	2,333,160	5,333,867	0.4374	www.myamerigroup.com/English/Documents/TXTX_Benefits_Overview_STAR_ENG.pdf
Blue Cross Blue Shield	Travis	133,827	555,274	0.2410	www.bcbstx.com/medicaid/star.html
Christus	Nueces	14,388	185,335	0.0776	www.christushealthplan.org/members/medicaid/value-adds
Community First	Bexar	140,382	1,136,611	0.1235	www.cfhp.com/Members/STAR/Medicaid-Mbr-Hndbk-0114.pdf
Community Health Choice	Harris, Jefferson	1,164,920	2,200,235	0.5295	www.chchealth.org/GetFile.aspx?FileId=171
Cook Children's	Tarrant	340,392	658,888	0.5166	www.cookchp.org/English/members/STAR-members/Pages/Programs-and-Benefits.aspx
Driscoll	Nueces, Hidalgo	19,987	1,633,050	0.0122	www.dchpkids.com/star/services.php
El Paso Premier	El Paso	27,419	670,604	0.0409	www.epfirst.com/PremierPlan.html
First Care	Lubbock	43,287	228,564	0.1894	www.firstcare.com/STAR_Medicaid
Molina	Dallas, El Paso, Harris, Hidalgo, Jefferson	1,842,117	5,428,123	0.3394	www.molinahealthcare.com/members/tx/en-US/mem/medicaid/star/PDF/TX_STAR_Member_Handbook.pdf
Parkland	Dallas	644,179	1,109,569	0.5806	www.parklandhmo.org/Handbooks/parkland%20english.pdf
Sendero	Travis	133,827	555,274	0.2410	www.senderohealth.com/en/members/value-adds
Seton	Travis	133,827	555,274	0.2410	www.setonhealthplan.com/members/chip/STAR_handbook-12-13%20edit.pdf
Superior Health	Bexar, El Paso, Hidalgo, Lubbock, Nueces, Travis	364,902	4,224,103	0.0864	www.superiorhealthplan.com/for-members/benefits-information/extra-benefits/
Texas Children	Harris, Jefferson	1,164,920	2,200,235	0.5295	www.texaschildrenshealthplan.org/for-members/star/
United Health	Harris, Hidalgo, Jefferson	1,170,519	3,647,950	0.3209	http://www.uhccommunityplan.com/content/dam/communityplan/plandocuments/handbook/en/TX-star-handbook.pdf

Notes: 2010 population counts by race and county are from the 2010 Census: http://www.dshs.state.tx.us/chs/popdat/st2010c.shtm. Counties served by each plan are listed here: http://www.hhsc.state.tx.us/medicaid/managed-care/mmc/STAR-map.pdf. Counties are grouped into service areas as follows: Bexar Service Area= Atascosa, Bandera, Bexar, Comal, and Guadalupe; Dallas SA = Collin, Dallas, Ellis, Hurt, Kaufman, Navarro, and Rockwall; El Paso SA = El Paso and Hudspeth; Harris SA = Austin, Brazoria, Fort Bend, Galveston, Harris, Matagorda, Montgomery, Waller and Wharton; Hidalgo SA = Cameron, Duval, Hidalgo, Jim Hogg, Maverick, McMullen, Starr, Webb, Willacy and Zapata; Jefferson SA = Chambers, Hardin, Jasper, Jefferson, Liberty, Newton, Orange, Polk, San Jacinto, Tyler, Walker; Lubbock SA = Carson, Crosby, Deaf Smith, Floyd, Garza, Hale, Hockley, Hutchinson, Lamb, Lubbock, Lynn, Potter, Randall, Swisher, Terry; Nueces SA = Aransas, Bee, Brooks, Calhoun, Goliad, Jim Wells, Karnes, Kenedy, Kleberg, Live Oak, Nueces, Refugio, San Patricio, Victoria; Tarrant SA = Denton, Hood, Johnson, Parker, Tarrant, Wise; Travis SA = Bastrop, Burnet, Caldwell, Fayette, Hays, Lee, Travis, Williamson.

Appendix Table B15: Black/Hispanic Ratio by Services Offered

Benefit	Plans offering Benefit	Average Bl/Hisp
Baby shower or other social event	Community First, Community Health Choice, Driscoll, Firstcare, Texas Children's, Superior, United	0.2559
Prenatal gifts	Aetna, BCBS, Christus, Driscoll, El Paso, FirstCare, Parkland, Texas Children's, Sendero, Seton, Superior	0.2279
Postnatal gifts	BCBS, Community First, Community Health, Driscoll, El Paso, FirstCare, Molina, Sendero, United	0.2264
Hosts prenatal classes	Amerigroup, Community First, Community Health, Driscoll, El Paso, Superior, Texas Children's	0.2513
In-home visits for high-risk members	BCBS, Christus, Seton, Texas Children's, United	0.2820

See notes to the previous table.

C Back-of-the-envelope calculations

C.1 Estimating the undocumented share of foreign-born Hispanic mothers in Texas

We calculate this share for the year 2000. According to the U.S. Census, there were $20,851,820$ residents in Texas in 2000.[5] According to the Pew Hispanic Center, there were 1.1 million undocumented immigrants in Texas in 2000.[6] Also according to Pew, 76 percent of undocumented immigrants nationwide are Hispanic, which is a vast underestimate for Texas, given its position on the U.S.-Mexican border.[7] As such, a lower bound for the number of undocumented Hispanics in Texas is $0.76 * 1,100,000 = 836,000$.

Using the 2000 IPUMS, we calculate that foreign-born Hispanics (regardless of their immigration status, which the Census does not record) account for 9.77 percent of the Texas population, or $0.0977 * 20,851,820 = 2,037,222$ people.

Finally, Pew notes that undocumented immigrants are 34 percent more likely to have children (the relevant group for our regression analysis) than are documented immigrants.[8] We thus gross up the estimated number of undocumented Hispanics in the first paragraph by 1.3.

Our final calculation of the share of Hispanic foreign-born mothers who are undocumented is thus $(1.3 * 836,000) \div 2,037,222 = 53.3$ percent. Again, because we assume that the Hispanic share of undocumented immigrants in Texas is equal to the national share, this calculation is a lower bound.

C.2 Back-of-the-envelope calculation on selection

Suppose that, despite the evidence in Appendix Table B10, the "missing" black infants would have been very healthy (perhaps on unobservable margins), which would bias us toward finding deleterious effects for black infants post MMC. We can calculate how much healthier than the pre-period baseline they would have to be for our effect to be fully explained by compositional changes.

In supplementary analyses, we estimated the effects of MMC on births by black women. Our (insignificant) estimate suggests that roughly 2.5 percent of black births may "disappear" post MMC. Call this value α. From Table 3, we find that, among the 0.975 percent of births that "remain" observable post-MMC, the increase in mortality is 0.00179 percentage points. Call this value β^{obs}. How large a decrease from baseline would the missing 2.5 percent have had to exhibit for our effect to be completely explained by selection (call this value β^{unobs})?

$$
\begin{aligned}
&(1-\alpha)\cdot\beta^{obs} + \alpha\cdot\beta^{unobs} = 0 \Rightarrow \\
&\beta^{unobs} = \frac{-(1-\alpha)\cdot\beta^{obs}}{\alpha} \approx \frac{-0.975\cdot 0.00179}{0.025} \approx -.069.
\end{aligned}
$$

[5]See http://www.census.gov/population/www/cen2000/maps/files/tab02.pdf.

[6]See http://www.pewhispanic.org/2011/02/01/appendix-a-additional-figures-and-tables/.

[7]See http://www.pewhispanic.org/2009/04/14/a-portrait-of-unauthorized-immigrants-in-the-united-states

[8]See http://www.pewhispanic.org/2009/04/14/a-portrait-of-unauthorized-immigrants-in-the-united-states
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But mean black mortality is only 0.012 (see Table 1), so in order for the "missing" births to be fully explaining our results, they would have had to exhibited a *negative* mortality rate, which is of course impossible.