Economics Working Paper Series
Faculty of Business, Economics and Law, AUT

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2020/09

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August 2020

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Abstract: Between 1997 and 2000, all states in the United States (US) enacted the State Children's Health Insurance Program (SCHIP) to provide publicly funded health insurance coverage for children in low income families. However, only 15 states including the District of Columbia chose to provide coverage for children of newly arrived immigrants in their SCHIP. We exploite the resulting state and time variation in the implementation of the program in a difference-in-differences framework to estimate the effect of a publicly funded children's health insurance benefit on immigrant women's fertility. While estimates from full samples show that the net effect of the program was indistinguishable from zero, we find a significant positive effect on the fertility of unmarried immigrant women, both at extensive and at intensive margin. Our findings have important policy implications for societies experiencing a persistent decline in fertility.

Keywords: State Children's Health Insurance Program; Immigrant Fertility; Birth rate; Quantity-quality tradeoff.

JEL Codes: I13; J13

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Acknowledgement: We are thankful to the participants and discussants of Midwest Economic Association (2019), St. Louis USA; International Health Economics Association (2019), Basel, Switzerland; and Southern Economic Association (2019) Fort Lauderdale, USA for providing helpful comments and feedback on the analysis. We are solely responsible for all errors committed in this study.

1. INTRODUCTION

This study investigates the impact of the Child Health Insurance Program (CHIP), formerly known as the State Children's Health Insurance Program (SCHIP), on immigrant women's fertility.[1] The conceptual foundation underlying our analysis is the so called 'quantity-quality trade-off model' which implies that given limited resources, parents are forced to optimize their fertility decisions based on their quantity/quality preferences (Becker & Lewis 1973; Becker & Tomes 1976). According to the model, an increase in child quantity often requires compromising on the allocation of limited resources such as parental time and market-based goods including food, nutrition, and healthcare across off-springs. Therefore, social welfare programs that can effectively reduce parents' financial burden by extending health insurance coverage to uninsured children can arguably boost childbirth incidence[2].

The CHIP is a large-scale joint initiative between the federal and state governments to provide health insurance coverage to uninsured children in low-income ('working poor') families who do not qualify for Medicaid.[3] Although eligibility criteria in the benefit program may vary across states, in general the program extends enrolment among children whose family income lies above the Medicaid eligibility but lower than 200% of Federal poverty level (Edmunds et al. 1998). Enacted into law as a part of the Balanced Budget Act in 1997, implementation of CHIP across states prompted a drop in child uninsured rate from 14% to 7% (Paradise 2014). As CHIP reduces out-of-pocket child healthcare expenses for low-income groups, the welfare program can be expected to lower marginal cost of having a child thereby influencing fertility decisions.[4]

The Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996 prohibited all non-naturalized newly arrived immigrants from receiving any federal means-tested benefits including the Medicaid.[5] However, utilizing state autonomy afforded by the Balanced Budget Act, 15 states including Washington DC ('generous' states) included children of newly arrived immigrants in their CHIP.[6] Newly arrived non-naturalized immigrants in other 'non-generous' states remained ineligible for CHIP coverage. We exploit this variation in immigrant eligibility for CHIP benefits across states as a 'natural experiment' in a difference-in-differences (DD) framework to estimate the effect of child health care benefit on fertility. Although our current analysis focuses on immigrant women, our findings suggest the need for additional research to see if similar benefits targeted at children can be effective at enhancing fertility at least among some population groups.

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[1] Our focus on immigrant population is motivated by a policy variation, described later, that affords relatively straightforward causal identification in this group.

[2] See Doiron and Kettlewell (2020) for latest evidence on how fertility decisions are associated with demand for health insurance.

[3] Medicaid provides health insurance coverage to low income families. This program is not specifically targeted to children.

[4] We explain the potential underlying mechanisms using a standard quantity-quality tradeoff model in Appendix Section A.1.

[5] Prohibition lasted for five years after entering as an immigrant. Certain categories such as refugees were exempted from the restriction.

[6] We provide state-specific years of implementation and relevant classification by generosity in Appendix Table A.1.

2. METHODS

2.1 Prior evidence

There is ample evidence that social welfare interventions such as parental leave, income tax credits, and childcare support that are effective in reducing parental resource constraints can positively influence childbearing decisions (Lalive & Zweimuller, 2009; Azmat & González 2010; Haan & Wrohlich, 2011; Brewer & Ratcliffe, 2012). However, majority of the studies in this space draw from the experiences of European economies that are also characterized by generous public benefits on several other fronts not directly related to child care costs (Walker, 1995; Ronsen, 2004; Duvander & Andersson, 2006; Gauthier, 2007). The relatively scant US-based evidence pertinent to our analysis includes evidence on the beneficial impacts of means-tested benefit programs like Medicaid on prenatal care and birth outcomes (Ray et al., 1997; Baldwin et al., 1998). Most closely related to our study is a paper by Zavodny & Bitler (2010) who explore the effects of Medicaid eligibility expansions on fertility. The authors find that, on average, the eligibility-based intervention did not affect overall birth rates but did boost fertility in a small subset of white women without a high school degree.

2.2 Data and Model

We utilize the data from Annual Social and Economic Supplement of the Current Population Survey (CPS) for the years 1997 through 2009.[7] The outcome variable in our analysis is a binary indicator denoting whether an immigrant woman gave birth to a new child during a given year. The key explanatory variable is the availability of generous CHIP in the respective state and year. Covariates include age, race, ethnicity, marital status, education, number of other children and indicator for having a child younger than five. State level covariates include state unemployment rate as a proxy for economic conditions in the state and an indicator for whether governor is democrat as a proxy for political/social conditions in the state. The descriptive information of all the variables used in our analysis is summarized in Table 1.[8]

We analyze fertility decisions of immigrant women of childbearing ages (15-45).[9] First, we look at the effect of generous CHIP implementation on childbearing of an overall sample of immigrant women and then we classify the samples by their marital status. For each sample, we estimate the DD model

$$Y_{ist} = \beta_1 + \beta_2 . CHIP_{st} + X_{ist} . \beta_3 + Z_{st} . \beta_4 + \eta_s + \lambda_t + \phi_s . t + \epsilon_{ist} \qquad (1)$$

where Y_{ist} is a binary indicator of childbirth of an immigrant woman *i* in state *s* and the year *t*. $CHIP_{st}$ indicates whether the state *s* in year *t* has a generous CHIP in place. The parameter β_2 represents the estimate of the impact of generous CHIP on childbearing among immigrant women. To account for endogeneity arising from exclusion of relevant covariates, we control for a range of individual-and state-level characteristics (X_{ist} and Z_{st}), state (η_s) and year (λ_t) fixed effects, and state-specific linear time trends ($\phi_s . t$). In addition to the DD regressions, we conduct an event analysis, described later in the manuscript, as a test for parallel trends assumption necessary for DD analysis.

As an important supplement to our baseline analysis, we also employ a difference-in-difference-in-differences (DDD) model that estimates change in fertility of immigrant women in generous states net

[7] Due to the introduction of substantial welfare reforms by the PRWORA, the pre-1997 era represents a distinct welfare regime. Furthermore, in 2009 the CHIP Reauthorization Act (CHIPRA) allowed all states to cover all immigrant children with federal funds, irrespective of when they entered the country.
[8] We present summary stats on a combined sample of women including immigrants and natives for comparison purposes.
[9] For robustness check, we also analyze a smaller sample of women aged 17-40 where most births are concentrated. See Figure A.1.

of changes in fertility of immigrant women in non-generous states as well as net of changes in fertility of non-immigrants who do not stand to be affected by generous CHIP. The triple difference model takes the form

$$Y_{ist} = \delta_1 + \delta_2 . Immi_i . Generous_s . Post_{st} + \delta_3 . Immi_i . Generous_s + \delta_4 . Immi_i . Post_{st} + \delta_5 . Generous_s . Post_{st} + \delta_6 . Immi_i + \delta_7 . Generous_s + \delta_8 . Post_{st} + X_{ist} . \delta_9 + Z_{st} . \delta_{10} + \eta_s + \lambda_t + \phi_s . t + \upsilon_{ist} \quad (2)$$

where, $Immi_i$ is the indicator of whether woman *i* is an immigrant; $Generous_s$ is an indicator of whether state *s* covers immigrant population in its CHIP; and $Post_{st}$ equals 1 to represent post-CHIP implementation years for state *s*. The parameter δ_2 represents the DDD estimate of the impact of the policy of our interest in fertility of immigrants. The triple difference estimator ensures that we are accounting for any unobserved changes that may differentially affect fertility in generous and non-generous states.

3. RESULTS

Our main results from estimating Equation 1 are presented in Table 2. We analyze three sample types: all immigrant women, married immigrant women, and unmarried immigrant women.[10] Consistent with Zavodny & Bitler's (2010), the weighted linear probability model (LPM) estimates indicate that CHIP did not have any statistically significant impact on the overall immigrant population. The estimates of the effect of CHIP on fertility of married immigrant women is also in line with the full sample results and shows no effect distinguishable from zero. However, the program appears to have a significant positive impact on women who are not in a married relationship. Importantly, this group has the lowest average family income and health insurance coverage rate (see Table 1). For unmarried immigrant women aged 15-45, CHIP implementation in generous states is followed by a 1.8 percentage point increase in the probability of having a childbirth (see Table 2, Panel A). The coefficient is statistically significant at 1% level. Results from the 17-40 age group, presented in Panel B are not too different. It is reassuring to see that the results from the triple difference (DDD) model shown in Panel C are also qualitatively similar to those obtained from our DD model.

As a suggestive test for parallel trends assumption, we examine the effect of CHIP on immigrant fertility with an event study analysis. With data coded from -3 to +10 years from CHIP implementation, and -3 as the omitted category, we do not find any statistically significant leads in our event analysis.[11] Results are graphically presented in Figure 1. In line with the DD results, the lags suggest no post CHIP swings in fertility in case of combined and married sample but an upward swing in fertility of unmarried sample.

Next we conduct a series of robustness checks. First, we estimate the effects of CHIP on immigrants at the intensive margin by investigating childbirth outcomes of women with at least one additional biological child. Second, we test the effect of CHIP on fertility of women who lie below 150% of the federal poverty threshold. And third, to account for self-selection bias that may arise from immigrant women migrating to generous states, we conduct a robustness check by limiting our sample to females who did not relocate to another state in the year prior to survey. Results from all of these checks are presented in Table 3 and do not depart heavily from our main results.

[10] In unreported analyses, we test for the effect of CHIP on fertility of a combined sample of immigrant and native women in the US and do not find any statistically significant effect of the program. Results are available upon request.
[11] Further details on event study analysis available on request.

4. CONCLUSION

Since 2007, the total fertility rate has been declining in the US. Globally, low fertility combined with increasing life expectancy has resulted in rapidly ageing population across several major economies. This ageing phenomena can have significant long-term macroeconomic implications such as labor shortages, fiscal burden, and reduced innovations. Our study provides important insights into the understanding of whether financial safety net provided by social welfare programs that can reduce cost of raising a child influence individuals' childbearing decision. In large combined samples, we do not find any impact of CHIP on fertility. However, consistent with the quantity-quality tradeoff model, we do find a significant rise in childbirth incidence among a subpopulation of immigrant women who are likely to belong to a socio-economically vulnerable group. Our findings suggest the need for further research to explore the specific mechanisms behind these results and assess the extent to which these findings can be generalized to other population groups.

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Table 1
Summary statistics

	All women (native and immigrant)			Immigrant women		
	Overall	Married	Unmarried	Overall	Married	Unmarried
Gave birth to a new child	0.056	0.084	0.028	0.068	0.090	0.033
SCHIP	0.890	0.887	0.892	0.895	0.897	0.891
Generous SCHIP	0.388	0.375	0.401	0.550	0.539	0.569
Unemployment rate	5.278	5.236	5.317	5.509	5.505	5.516
Democrat governor	0.442	0.437	0.446	0.423	0.423	0.423
Lower than HS	0.210	0.098	0.318	0.312	0.284	0.357
HS graduate	0.278	0.300	0.256	0.267	0.278	0.249
Some college	0.204	0.184	0.222	0.134	0.110	0.173
Associate degree	0.085	0.110	0.060	0.060	0.064	0.053
Bachelor	0.165	0.222	0.110	0.157	0.180	0.121
Employed	0.720	0.754	0.687	0.625	0.607	0.654
Any health insurance coverage	0.824	0.862	0.788	0.661	0.690	0.614
Medicaid coverage	0.112	0.055	0.167	0.103	0.074	0.152
Age	30.641	35.177	26.282	31.984	34.364	28.143
White	0.803	0.859	0.749	0.684	0.698	0.663
African American	0.119	0.065	0.171	0.080	0.058	0.116
Native	0.015	0.011	0.019	0.008	0.008	0.009
Asian	0.046	0.052	0.041	0.212	0.223	0.194
Hispanic	0.169	0.169	0.169	0.530	0.529	0.531
Married	0.490			0.617		
Family income (annual)	64,929.400	78,936.360	51,471.620	55,283.840	63,906.120	41,366.210
Number of own children	1.153	1.753	0.577	1.381	1.812	0.686
Number of own child aged<5	0.313	0.480	0.153	0.388	0.519	0.177
Immigrant	0.155	0.195	0.116			
Sample	558858	273841	285017	86497	53409	33088

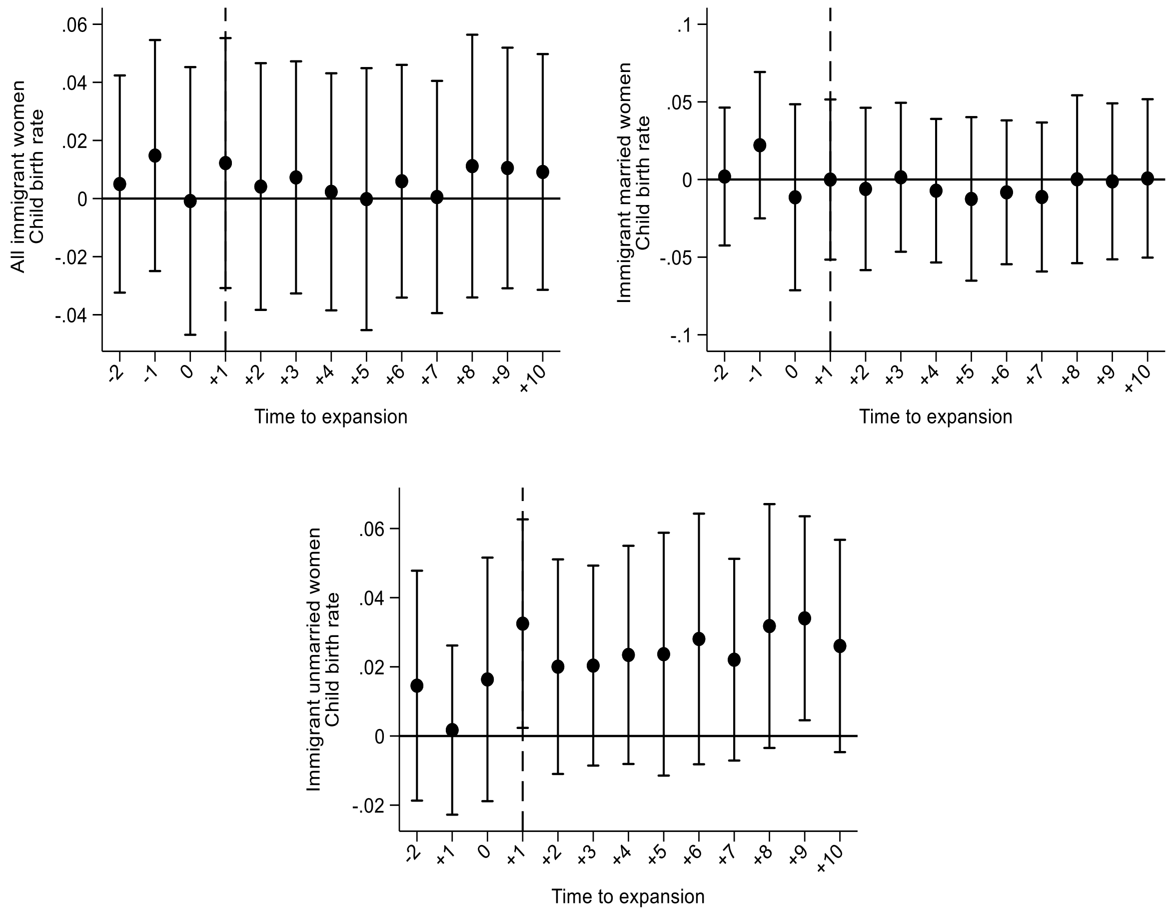
Notes: Data include women aged 15-45 from Annual Social and Economic Supplement of the Current Population Survey 1997-2009.The measure for annual family income is adjusted for inflation using 2005 as the reference base year.

Table 2
Effects of Generous CHIP on immigrant women's fertility

Panel A: Ages 15-45	All women	Married	Not married
	(1)	(2)	(3)
Generous CHIP	-0.004	-0.017	0.018***
	(0.007)	(0.011)	(0.006)
Observations	86,497	53,409	33,088
Panel B: Ages 17-40			
Generous CHIP	-0.004	-0.021	0.024***
	(0.009)	(0.013)	(0.006)
Observations	68,122	41,879	26,243
Panel C: Triple difference model (ages 15-45)			
Generous CHIP	-0.002	-0.017	0.019***
	(0.008)	(0.011)	(0.006)
Observations	558,858	273,841	285,017

Notes: All models control for personal characteristics, state characteristics, state-specific linear time trends, year fixed effects (state FE), and state fixed effects (Year FE). All the LPM regressions are weighted by ASEC sample weights. Standard errors are clustered at the state level and are reported in parentheses. ***,**,* = statistically different from zero at the 1%,5%,10% level.

Figure 1
Dynamic effects of Generous CHIP implementation on immigrant women's fertility



Notes: The period representing 3-year prior CHIP implementation is treated as the omitted category.

Table 3

Robustness checks on subsamples of immigrant women

	Same state residents		Women with child		< 150% poverty threshold	
	DD estimates	DDD estimates	DD estimates	DDD estimates	DD estimates	DDD estimates
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All immigrant women						
Generous SCHIP	-0.004	-0.002	0.002	-0.003	0.007	0.008
	(0.008)	(0.008)	(0.012)	(0.012)	(0.015)	(0.014)
Observations	81,831	539,107	38,376	209,938	29,264	129,567
Panel B: Immigrant married women						
Generous SCHIP	-0.015	-0.015	-0.012	-0.017	-0.015	-0.011
	(0.012)	(0.013)	(0.014)	(0.013)	(0.025)	(0.023)
Observations	50,790	264,802	31,637	162,001	14,982	37,970
Panel C: Immigrant not married women						
Generous SCHIP	0.016**	0.018***	0.068***	0.061***	0.029***	0.027***
	(0.007)	(0.006)	(0.021)	(0.018)	(0.009)	(0.009)
Observations	31,041	274,305	6,739	47,937	14,282	91,597

Notes: All models control for personal characteristics, state characteristics, state-specific linear time trends, year fixed effects (state FE), and state fixed effects (Year FE). All the LPM regressions are weighted by ASEC sample weights. Standard errors are clustered at the state level and are reported in parentheses. ***,**,* = statistically different from zero at the 1%,5%,10% level.

APPENDIX

A.1 Theoretical framework

We begin with Millimet & Wang's (2011) utility maximization problem, which is a modified version of Becker & Tomes' (1976) quantity-quality trade-off model. One of the important features of Millimet & Wang's (2011) model is that the authors consider health-related resources and health endowment as inputs of child quality. Households' objective is to maximize their utility U given by the function $U = U(n, q, c)$, where n represents child quantity, q represents child quality, and c is consumption. Further, q is a function of market-based health inputs w and child's health endowment θ. In particular, child quality is represented by the production function: $q = q(w, \theta)$, where q is positively related to both w and θ ($q_w > 0$ and $q_\theta > 0$).

Households maximize their utility subject to a budget constraint given by:

$$c.p_c + n.p_n + wn.p_w = M \quad (A.1)$$ [12]

, where M denotes household income, p_c is the unit price of consumption, p_n is the cost per child, and p_w represents price of market-purchased health inputs. In presence of economic support provided by the CHIP, equation A.1 can be modified to:

$$c.p_c + n.p_n + wn.(p_w - p_{chip}) = M \quad (A.2)$$

where p_{chip} represents state-sponsored healthcare support for each unit of health input purchased. The equilibrium condition for the constrained utility maximization problem is given by:

$$\frac{\partial U}{\partial c} = \lambda p_c = \lambda \pi_c \quad (A.3)$$

$$\frac{\partial U}{\partial q} = \lambda \frac{(p_w - p_{chip})}{\partial q/\partial w} n = \lambda \pi_q \quad (A.4)$$

$$\frac{\partial U}{\partial n} = \lambda (wp_w - wp_{chip} + p_n) = \lambda \pi_n \quad (A.5)$$

In the above equations, π_c , π_q and π_n are the shadow prices of consumption, child quality, and child quantity, respectively. The equilibrium conditions suggest that while an unplanned or exogenous increase in number of children increases the shadow price of child quality, a state-sponsored child health insurance represented by p_{chip} is negatively related with the same. More specifically, *ceteris paribus*, CHIP coverage can reduce the cost for parents to improve child health quality if they decide to have additional child.

[12] Millimet & Wang (2011) also include children's sex ratio in their model assuming that having more children belonging to the same sex can be provide certain cost advantages to households.

Table A.1 –CHIP implementation and immigrant coverage by state

States	**Date of implementation**	**Coverage for immigrants**
Alaska (AK)	March 1999	Yes
Alabama (AL)	February 1998	No
Arkansas (AR)	October 1998	No
Arizona (AZ)	October 1997	No
California (CA)	July 1998	Yes
Colorado (CO)	April 1998	No
Connecticut (CT)	October 1997	No
District of Columbia (DC)	September 1997	Yes
Delaware (DE)	October 1998	Yes
Florida (FL)	April 1998	No
Georgia (GA)	September 1998	No
Hawaii (HI)	January 2000	Yes
Iowa (IA)	July 1998	No
Idaho (ID)	October 1997	No
Illinois (IL)	January 1998	Yes
Indiana (IN)	October 1997	No
Kansas (KS)	July 1998	No
Kentucky (KY)	July 1998	No
Louisiana (LA)	November 1998	No
Massachusetts (MA)	October 1997	Yes
Maryland (MD)	July 1998	No
Maine (ME)	July 1998	No
Michigan (MI)	May 1998	No
Minnesota (MN)	September 1998	Yes
Missouri (MO)	October 1997	No
Mississippi (MS)	July 1998	No
Montana (MT)	January 1998	No
North Carolina (NC)	October 1998	No
North Dakota (ND)	October 1998	No
Nebraska (NE)	May 1998	Yes
New Hampshire (NH)	May 1998	No
New Jersey (NJ)	February 1998	Yes
New Mexico (NM)	May 1998	Yes
Nevada (NV)	October 1998	No
New York (NY)	April 1998	Yes
Ohio (OH)	January 1998	No
Oklahoma (OK)	December 1997	No
Oregon (OR)	July 1998	No
Pennsylvania (PA)	June 1998	Yes
Rhode Island (RI)	October 1997	No
South Carolina (SC)	October 1997	No
South Dakota (SD)	July 1998	No
Tenessee (TN)	October 1997	No
Texas (TX)	July 1998	No
Utah (UT)	August 1998	No
Virginia (VA)	October 1998	Yes
Vermont (VT)	October 1998	No
Washington (WA)	January 2000	Yes
Wisconsin (WI)	April 1999	No
West Virginia (WV)	July 1998	No
Wyoming (WY)	April 1999	No

Source: Rosenbach et al., 2001 and Ghimire (2018). The information on coverage for new immigrants pertains to years prior to 2009.

Figure A.1 – Distribution of birth across ages of women