COVERING UNDOCUMENTED IMMIGRANTS:
THE EFFECTS OF A LARGE-SCALE PRENATAL CARE INTERVENTION

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ABSTRACT

Undocumented immigrants are ineligible for public insurance coverage for prenatal care in most states, despite their children representing a large fraction of births and having U.S. citizenship. In this paper, we examine a policy that expanded Medicaid pregnancy coverage to undocumented immigrants. Using a novel dataset that links California birth records to Census surveys, we identify siblings born to immigrant mothers before and after the policy. Implementing a mothers' fixed effects design, we find that the policy increased coverage for and use of prenatal care among pregnant immigrant women, and increased average gestation length and birth weight among their children.

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There are nearly 11 million immigrants without legal status in the U.S. (Krogstad et al., 2018), and it is estimated that one out of every 13 births in the country is to an undocumented immigrant mother (Camarota et al., 2018). Undocumented immigrants are economically worse off and are less likely to have health insurance than the general U.S. population (Goldman et al., 2005; Borjas, 2017). They also face restricted access to public benefits. The Medicaid program covers the expense of labor and delivery for these women, but in most states undocumented immigrant women do not qualify for routine prenatal care during pregnancy. Available evidence indicates that undocumented immigrant women are less likely to use adequate prenatal care and experience more complications of labor and delivery than other women (Reed et al., 2005; Korinek and Smith, 2011).[1] By removing financial barriers to care, expanding public insurance for prenatal care to this population could increase access to health services and improve the health of these mothers and their children, who are U.S. citizens by birthright.

In this paper, we examine one of the first expansions of prenatal coverage to undocumented immigrants: a landmark policy change in California, the state with the largest population of undocumented immigrants in the U.S. (Pew Research Center, 2016). In 1988, California extended eligibility for its Medicaid program, Medi-Cal, to undocumented pregnant immigrants who previously did not qualify for coverage due to their legal status. We estimate that nearly two-thirds of undocumented immigrant women of reproductive age gained Medi-Cal eligibility as a result. By 1991, 45 percent of Medi-Cal funded births in the state were to undocumented immigrant women, and one-sixth of all births in the state were Medi-Cal funded births to this group (Norton et al., 1996).[2] Representing approximately 100,000 births, the number of infants to undocumented immigrants with Medi-Cal coverage in 1991 exceeds the total number of births in any one of 41 different U.S. states in 2019 (Martin et al., 2021).

While expanded public insurance has been a primary policy lever to improve infant health in the U.S., changes to cover prenatal care for women who are undocumented immigrants have been slower to be adopted. Congress enacted a series of federal statutes starting in the late 1980s that required states to expand Medicaid eligibility for pregnant women and infants (Howell, 2001). However, these expansions were limited to legal immigrants. Only more recently has federal policy addressed the

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[1]There are few studies documenting prenatal care utilization and birth outcomes of immigrant mothers in the U.S. by legal status, likely due to the limited availability of data with detailed immigration information. The evidence cited here is from smaller-scale studies of immigrants in Colorado (Reed et al., 2005) and Utah (Korinek and Smith, 2011).

[2]We are including newly legalized immigrants under the Immigration Reform and Control Act (IRCA) in the "undocumented" category in our discussion here since this group also gained eligibility under the October 1988 expansion. Please see further discussion in Section 1.

prenatal coverage of undocumented immigrants. The Children's Health Insurance Program (CHIP) unborn child option was introduced in 2002 and allowed states to use federal funding to cover a woman's pregnancy-related care regardless of her immigration status. As of 2021, 17 states have adopted this option (Brooks et al., 2021). In addition, two states have state-funded programs to cover some amount of health care services for pregnant undocumented immigrants (Fabi, 2019). In total, 19 states currently offer some type of coverage for this group, leaving pregnant undocumented immigrants uncovered in the majority of states. In general, U.S. public opinion and policymakers remain divided on whether government health programs should cover undocumented immigrants (e.g. Luhby, 2019).

Better information on the benefits and costs associated with government coverage for undocumented immigrants may help guide these conversations and state policy decisions. However, surprisingly little is known about the consequences of publicly-funded coverage for undocumented immigrants. In the economics literature, the focus on public coverage during pregnancy has been nearly exclusively on expansions in income eligibility, which rarely include undocumented immigrants. This body of work finds clear evidence of increased prenatal care utilization, but mixed findings with regards to whether expanded coverage translates into improved birth outcomes. In general, any documented improvements in infant health appear to be small in size, or concentrated among the most disadvantaged women gaining coverage.[3] This suggests that the benefits of expanded coverage for undocumented immigrant families, who have lower family incomes and higher rates of uninsurance than U.S.-born families (Fortuny et al., 2007), could be large.

However, there are a number of different considerations that are specific to this population. For example, limited English language proficiency, confusion around program eligibility rules, or fears about repercussions for using public benefits are documented barriers to enrollment (Feld and Power, 2000). In addition, language-, cultural-, and discrimination-related challenges to navigating the health care system and receiving quality care (Flavin et al., 2018), as well better average health outcomes documented among immigrant families when compared to U.S. families (i.e. the "immigrant health advantage", Riosmena et al., 2017), are reasons that expanded access may not necessarily lead to health improvements. Developing a better understanding of the impact of this public intervention is crucial for establishing effective policies to improve outcomes for the children of undocumented immigrants,

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[3]See a more detailed discussion of the income-based expansions in Miller and Wherry (2019) drawing on evidence from Currie and Gruber (1996b, 1997); Dubay et al. (2001); Currie and Grogger (2002); Dave et al. (2008); Levine and Schanzenbach (2009), and others.

for whom we observe worse outcomes in the longer term compared to children of U.S.-born parents, including higher rates of poverty and lower public program participation, less educational attainment, and worse mental health (Menjívar and Gómez Cervantes, 2016).

A handful of recent studies examine state prenatal expansions to undocumented immigrants under the CHIP unborn option or other state programs (Drewry et al., 2015; Atkins et al., 2017; Swartz et al., 2017; Wherry et al., 2017; Atkins et al., 2018; Hwang, 2021). This work finds consistent evidence of improved prenatal care utilization among pregnant immigrants, but little evidence of changes in infant health. A major caution with the interpretation of these results, however, is that there are likely to be important compositional changes in the immigrant population during the periods of study. The U.S. experienced tremendous growth in the number of undocumented immigrants in the 1990s and early 2000s when these policies were adopted (Krogstad et al., 2018). Not only did the number of undocumented immigrants increase, but there were changes in their characteristics and countries of origin in response to both U.S. immigration reforms and foreign policy (Massey and Pren, 2012). Not accounting for any concurrent changes in the characteristics of pregnant immigrants during this period may introduce bias into any estimated program effects.

Previous studies were unable to control directly for such compositional changes because their data sources lacked information on important maternal characteristics such as length of time in the United States, or detailed country of origin. In addition, in most of this work, the authors have been unable to discern whether immigrant women have legal or undocumented status, necessarily estimating changes for all immigrant women. This may make it difficult to detect effects of policies in states where undocumented immigrants represent only a small share of the total immigrant population.

In this paper, we examine the effects of a major expansion in Medi-Cal eligibility for pregnancy-related care to undocumented immigrant women. We evaluate the effects of the policy change on health insurance coverage, health care utilization, and birth outcomes for the children who were *in utero*. Given that such a large share of the state population was affected by this policy change, we are well powered to detect even very small changes in birth outcomes. We also overcome the existing empirical challenges described above by taking advantage of new opportunities for innovative data linkages facilitated by the U.S. Census Bureau. By linking confidential state birth certificate records to federal survey data held by Census, we construct a novel data source that allows us to identify sibling relationships, as well as detailed maternal characteristics, for a sizeable share of births in the state. This allows us to examine differential exposure to the Medi-Cal expansion across siblings born

to the same mother based on the timing of their birth using a mothers' fixed effects model, avoiding any biases resulting from the changes in the composition of immigrant mothers over the study period. We effectively compare outcomes for siblings born before and after the policy change. We also include siblings comparisons in the pre- or post-periods in the analysis, as well as children to U.S.-born women, as additional comparison groups. This allows us to control for birth order effects on outcomes, in addition to any statewide changes in outcomes over the study period.

While we estimate changes in average birth outcomes for all immigrant mothers resulting from the Medi-Cal expansion, we also take advantage of the rich characteristics available in the linked survey data to examine changes in outcomes for mothers who we identify as most likely to have undocumented status. Using detailed information on the mother's country of birth and her year of entry into the U.S, combined with information on her age and county of residence from the birth records, we estimate the individual probability that each woman had undocumented status at the time of the policy change. We then interact this probability with the expansion indicators in our regression analyses to estimate the effect of the policy for a likely undocumented mother and her infant.

Following the Medi-Cal expansion for undocumented immigrant women, we find evidence of an immediate and large increase in Medi-Cal coverage for prenatal care among immigrant women that continued to increase over time. Over the entire post period, we estimate that an average of 17 percent of mothers in this group gained Medi-Cal prenatal coverage, most of whom would otherwise have been uninsured. Among mothers identified as likely to have undocumented status, we estimate closer to a 40 percent increase in Medi-Cal prenatal coverage. We also find an immediate and sustained increase in the use of prenatal care among immigrant mothers. We estimate a 1.1 percentage point increase in prenatal care use, representing a near closure of the gap in rates of prenatal care use between immigrant and U.S.-born women in the state.[4] Among likely undocumented immigrant mothers, we estimate an increase in prenatal care use of approximately 2.5 percentage points, or a 64 percent reduction in the share of undocumented immigrant mothers using no prenatal care. We also find some evidence of earlier prenatal care initiation, as well as significant increases in both hospital deliveries for births and deliveries by physicians, rather than midwives. We find no change in the method of delivery.

Most importantly, we find that these changes in health care utilization translate into improved birth outcomes, as measured by increased average gestational length and birthweight for infants born

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[4]We estimate that rates of any prenatal care use were 97.3 and 98.9 percent for immigrant and U.S.-born mothers prior to the policy change.

to immigrant mothers. When scaled by our first stage estimate, our estimates imply an average 130 gram increase in birthweight (3.8 percent increase over baseline) and 3.7 day gestation length increase (1.3 percent over baseline) for the infants of newly covered immigrant mothers. When we examine where these changes occur in the distribution of these outcomes, we find a shift in birthweight in the middle of the birthweight distribution, increasing the share of births of 3500 grams or greater. We also find a corresponding shift in the gestational length of births from early term (37-38 weeks) to full term (39+ weeks). In addition to these changes, we find a significant decrease in the incidence of small-for-gestational age with our estimates suggesting close to a 5 percentage point decline among newly covered immigrant mothers, or a 54 percent decline over baseline.

We show that our results are robust to a variety of specification checks, including additional control variables and weighting to account for non-random participation in Census survey data. We also assess the sensitivity of our results to controls for other important policy changes during our study period. First, we explore the role of later income-based expansions in prenatal Medi-Cal that occurred just after the undocumented expansion. We control for the expansions in our model using variation across counties in exposure to the income-based expansions and show that our findings for the undocumented expansion are unchanged. Next, we exclude women who were eligible for immigration reforms during the study period, or who have a spouse who was eligible for these reforms; we use survey items in the linked Census and ACS data to identify these individuals. Our results are unchanged, ruling out the direct effect of the immigration reforms as a potential confounder. We also estimate a specification that uses only immigrant mothers and leverages differences in probable undocumented status to identify the policy effect. Estimates derived from this approach again confirm our main findings.

Finally, we conduct additional analyses to explore potential mechanisms behind the infant health improvements. We first examine whether these changes might be explained by fertility responses to the policy. If any policy-induced fertility changes lead to changes in the composition of births, this could help explain patterns observed in infant health outcomes. In our analysis of fertility response, we find that immigrant mothers are slightly more likely to give birth following the policy change. This could reflect changes in health during pregnancy, which may have in turn reduced miscarriages and resulted in more births conditional on pregnancy, or changes in desired fertility due to lower costs associated with pregnancy, which may have increased conception rates or reduced abortions. However, the magnitude of the fertility change is likely too small to explain our findings. Next we take

advantage of additional information available on the birth certificate records to look at changes in the number of prenatal visits and pregnancy complications following the expansion. These analyses indicate that immigrant women receive more prenatal visits once the policy goes into effect, and may experience a smaller number of pregnancy complications. These analyses suggest that access to medical care and improved health during pregnancy could be important mechanisms behind the infant health improvements.

Together this evidence indicates that expanded prenatal coverage to undocumented immigrants has important consequences for pregnancy outcomes, including infant health at birth. And, given a large existing literature showing that health at birth has long-run consequences for adult health and well-being (e.g. Black et al., 2007; Oreopoulos et al., 2008; Royer, 2009), it is likely that the implications will be even longer reaching.

1 Background

1.1 Content of Medicaid Pregnancy Coverage

Medicaid pregnancy coverage includes all pregnancy-related medical care, delivery-related care, and 60 days of postpartum care following childbirth. During the time period of study, the American College of Obstetricians & Gynecologists recommended between 13 and 15 visits for an uncomplicated pregnancy (The American College of Obstetricians and Gynecologists, 1985), similar to their current guidelines (American Academy of Pediatrics and American College of Obstetricians and Gynecologists, 2017). Initial prenatal care visits include comprehensive physical exams and a review of the patient's medical history with physician assessment of any risks that may require special management. Follow up visits continue to monitor the health of the pregnancy through physical examination and laboratory tests. In the case of any medical problems or pregnancy complications, more frequent visits are necessary to monitor these conditions and speciality care may be required, which would also be covered under pregnancy-related Medi-Cal coverage. The physician also develops plans for hospital admission, labor, and delivery with the patient.

Additional components of prenatal care include nutrition counseling, health and childbirth education, and services to address psychological and social stresses (The American College of Obstetricians and Gynecologists, 1985). In a national survey administered during this time period, most pregnant women with Medicaid-funded prenatal care reported receiving guidance related to nutrition and weight gain during their pregnancies, as well as instructions to limit or discontinue use of alco-

hol, tobacco, and illegal drugs (Miller and Wherry, 2019). In addition, 40 percent of women reported learning about the Women, Infants, and Children (WIC) program from their health provider and 76 percent received WIC benefits during their pregnancy.[5] In California, women enrolled in Medi-Cal were also eligible for enhanced services including personalized risk assessments for nutrition, health education, and psychosocial needs, and additional support services (Korenbrot et al., 1995).

Prior to the Medi-Cal expansion, more than 30 percent of immigrant mothers did not receive prenatal care in the first trimester as recommended by the U.S. Public Health Service. Focus group sessions held with providers delivering care to pregnant Latina women in San Francisco, and their patients, during this time period indicate that lower incomes, lack of health insurance, and the absence of legal documentation were among the largest barriers to early initiation of prenatal care (Guendelman and Witt, 1991). Nearly all immigrant women, however, did receive some form of prenatal care, although the average number of prenatal visits was much lower compared to U.S.-born women.[6] This information was first collected on the birth record in 1989 and the average number of prenatal visits was 9 versus 11 for immigrant and U.S.-born women in this year.

1.2 Changes in Medi-Cal Eligibility for Undocumented Immigrants

Prior to the policy change being studied, California's state Medicaid program, Medi-Cal, limited eligibility for immigrant women to those with permanent legal U.S. residency status (Norton et al., 1996). In the late 1980s, the state took advantage of new authority under federal law to expand Medi-Cal eligibility to pregnant immigrants with undocumented status. The Omnibus Budget Reconciliation Act (OBRA) of 1986 established the Emergency Medicaid program by specifying that Medicaid cover "emergency medical conditions," including emergency labor and delivery services, for immigrants who did not meet the legal residency requirements for the program (Perkins, 2004).[7] It also allowed states to newly draw down federal funds to help cover the medical expenses for these emergency medical conditions (Martucci, 1987).

While OBRA only required the coverage of labor and delivery services, California decided to go further than the federal requirement and include coverage for other pregnancy-related care as part

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[5]Immigrant women are eligible for benefits under the WIC program regardless of their legal status, which was also true during this period of study (Bosco, 1994).

[6]Uninsured women in the state, including undocumented immigrants, could receive free prenatal care from Title V funded maternal and child health clinics provided that they had family incomes below 200% FPL (Guendelman et al., 1994). However, only 0.04 percent of 1989 birth records for infants born to immigrant women indicate that Title V was the principal source of payment for prenatal care, as compared to 25 percent of records indicating care was paid for out-of-pocket.

[7]The Emergency Medical Treatment and Active Labor Act (EMTALA), also passed in 1986, required Medicare participating hospitals to provide emergency care, including labor and delivery services, regardless of ability to pay or immigration status.

of its OBRA expansion. The additional non-emergency pregnancy-related services were fully funded by the state (Martucci, 1987). All changes were effective starting in October 1988 under a new state law that extended Medi-Cal eligibility for pregnancy-related services, including prenatal, delivery, and postpartum care, to undocumented immigrants, as well as those with inadequate or expired documentation, or a temporary visa.[8] The state also expanded coverage to undocumented immigrants recently eligible for legal residence under the Immigration Reform and Control Act (IRCA), but who were temporarily ineligible for public benefits under the IRCA law (Martucci, 1988).[9]

During the next year, the state further expanded its Medi-Cal program to pregnant women with incomes above the current income eligibility threshold, which was around 85% of the federal poverty line.[10] Effective in July 1989, the state expanded Medi-Cal coverage for all pregnant women and infants with family incomes up to 185% FPL. A further eligibility expansion to 200% FPL was implemented in January 1990 (Mitchell, 2005). Both of the income expansions included immigrants regardless of legal status, but the vast majority of undocumented (89 percent) and IRCA immigrant (83 percent) women with deliveries covered by Medi-Cal qualified with incomes below the initial income thresholds, not the higher income expansions (Norton et al., 1996).

In Figure 1, we demonstrate that these policy changes had large impacts on the fraction of women of reproductive age eligible for Medi-Cal in the event of a pregnancy. This figure shows changes in eligibility over the study period by immigrant and legal status using California residents from the 1990 Census. We impute the legal status of immigrants using information on individual characteristics available in the survey and an algorithm developed by Borjas (2017).[11] The graph on the left shows a large change in eligibility for immigrant women between 1988 and 1990 of approximately 37 percentage points.

In the graph on the right, we see that the total change in eligibility for undocumented immigrants is staggeringly high at about 76 percentage points. This increase in eligibility is almost 2.5 times

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[8]While the effective date of the federal OBRA86 requirement was January 1, 1987, California was given until January 1, 1989 to implement this change since state legislation was needed to authorize a limited scope of Medi-Cal services to immigrants (Martucci, 1987).

[9]In 1986, the Immigration Reform and Control Act (IRCA) created a path to amnesty for certain groups of undocumented immigrants. Individuals who had been living continuously in the U.S. since January 1, 1982 and certain agricultural workers who had been employed in the U.S. for 90 or more days between May 1985 and May 1986 could apply for legalization. For a five year period after applying for legalization, these individuals were ineligible for certain public benefits (including Medicaid) but could receive emergency medical services (Norton et al., 1996).

[10]Since 1966, the state had covered pregnant women who met the income eligibility threshold for the Aid to Families with Dependent Children (AFDC) program under Medi-Cal. These women did not need to meet the family structure requirements for AFDC to qualify for Medi-Cal. In 1987, the AFDC income threshold was approximately 84% FPL for a family of three (Ellwood and Kenney, 1995).

[11]See Appendix Section A for additional information on the eligibility calculation and Section B for further information on the undocumented imputation methodology.

the size of the widely-studied income-based increase in prenatal Medicaid eligibility that occurred nationally between 1979 and 1991 (Currie and Gruber, 1996b). It also occurred over roughly the span of one year, rather than over the span of more than a decade, making it easy to demarcate a before and after period. In addition, consistent with the patterns of take-up reported earlier, we observe that the bulk of the change in eligibility occurred under the initial expansion to undocumented women in October 1988 that expanded eligibility to the lowest income levels (up to 85% FPL), rather than the later income-based expansions. For this reason, our analyses that follow will focus on the initial policy change, although we do trace out changes in coverage and outcomes over time.

A strong response to the Medi-Cal expansion for pregnant undocumented women was noted by Norton et al. (1996), using administrative Medi-Cal data from this time period that included the immigration status of enrollees. The number of Medi-Cal enrollees nearly doubled between 1987 and 1991 (from 116,000 to 228,000) and the authors estimate that approximately 78 percent of the growth was due to the expansion of coverage to undocumented and IRCA immigrant women.[12] In addition, Medi-Cal funded births to these groups represented 45 percent of all Medi-Cal funded births in 1991,[13] and about 1/6 of the total number of births in the state. While some of these women enrolled only during the last month of pregnancy, 88 to 93 percent initiated coverage earlier; and, the average period of enrollment during pregnancy was just over 5 months.[14] The vast majority of new immigrant enrollees (84 percent) after this policy change were undocumented immigrants rather than IRCA immigrants. Therefore, for simplicity, we refer to the newly eligible as "undocumented immigrants" throughout the text. Later we show that our findings are robust to excluding IRCA eligible immigrants from the analysis.

1.3 Evaluation of Expanded Prenatal Coverage for Undocumented Immigrants

Despite the large magnitude of the undocumented expansion in California, we are unaware of any existing study of this policy change. There has also been surprisingly little work examining publicly-funded prenatal coverage expansions to undocumented immigrants in other states. This may be partly due to the low prevalence of state efforts to cover this population prior to the 2002 CHIP unborn

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[12]Note that during this time period, it was illegal for Medi-Cal workers to ask applicants about their legal status. Thus, individuals who did not provide legal residency documents may have been classified as undocumented immigrants (Norton et al., 1996).

[13]This statistic is consistent with a letter published in the Orange County Register by the secretary of the Health and Welfare Agency of California in 1994 stating that 40 percent of all Medi-Cal births were to illegal immigrants residing in California (Smoley, 1994).

[14]The authors calculate enrollment statistics separately for undocumented and IRCA immigrants. Only twelve percent of women in the undocumented category enrolled during the last month of pregnancy and 7% for IRCA immigrants. The average number of months enrolled was 5.2 months for undocumented immigrants and 5.7 months for IRCA immigrants.

option, which first made federal funding available for their prenatal coverage.

Several recent studies have examined state adoption of the CHIP unborn option, as well as a separate state policy option to cover recent legal immigrants who have arrived to the U.S. within the last 5 years and do not yet qualify for federally-funded benefits.[15] These papers find evidence of increased insurance coverage during pregnancy (Jarlenski et al., 2014) and improved prenatal care utilization for immigrant women (Drewry et al., 2015; Swartz et al., 2017; Wherry et al., 2017) associated with state adoption of these policy options. The evidence on whether this leads to better birth outcomes is mixed. Drewry et al. (2015), Wherry et al. (2017), and Hwang (2021) find no detectable changes in birth outcomes using national study designs of these policies.[16] In contrast, Swartz et al. (2017) finds reductions in the incidence of extremely low birth weight babies and infant mortality in their study of expanded prenatal access for recent and undocumented immigrant women in the state of Oregon.

In addition to these studies, a handful of papers have examined the contraction of public health insurance benefits for undocumented or recent legal immigrants. Analyses of the termination of Medicaid benefits for undocumented pregnant women in 2010 in Nebraska find evidence of improved prenatal care utilization (Atkins et al., 2017, 2018), as well as higher maternal weight gain and increased abnormal conditions among newborns of undocumented immigrants, prior to the policy's discontinuation (Atkins et al., 2017). However, Atkins et al. (2017) document that the characteristics of undocumented immigrants giving birth in Nebraska differ significantly between the pre- and post-periods, making it difficult to discern whether these trends are, in fact, due to changes in the state's coverage policy.

Predating these studies is work examining the effects of Medicaid coverage for recent legal immigrants following the contraction of their eligibility for public benefits under federal welfare reform in 1996 (Joyce et al., 2001; Royer, 2005). These papers reach different conclusions regarding the effects of contracted Medicaid coverage on prenatal care utilization but agree that birth outcomes were mostly unaffected. However, since recent legal immigrants tend to be more advantaged than immigrants without legal status (e.g. Marshall et al., 2005), these findings may not necessarily shed light on the effects of expanded coverage to women with undocumented status.

Finally, another relevant study examines the effects of California's passage of Proposition 187 in November 1994, which restricted eligibility for public benefits to legal residents. Immediately chal-

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[15]The CHIP Reauthorization Act (CHIPRA) of 2009 allows states to waive the five-year waiting period for legal immigrants upon entry to the U.S. for Medicaid or CHIP prenatal coverage. The five-year waiting period was established under cash welfare reform in 1996.

[16]Hwang (2021) does, however, find evidence of improvements in child health and development measured at older ages.

lenged and never enforced, Spetz et al. (2000) document "chilling effects" following its passage in the form of reduced prenatal care visits among low-education immigrant women. The authors find, however, no evidence of resulting changes in birth outcomes.

1.4 Concurrent Changes in Immigration and the Characteristics of Immigrants

An important limitation of these existing studies is that they are unable to fully account for any concurrent changes in the characteristics of pregnant immigrant women that may affect the outcomes studied. Changes in the composition of immigrants, which may vary on both observed and unobserved dimensions, could generate spurious correlations between the timing of a Medicaid expansion and birth outcomes in a simple comparison across immigrant and U.S.-born groups. This is not a trivial concern with studying policies targeting undocumented immigrants, a group that has seen tremendous change in their numbers and composition over time in response to changes in national immigration policy (Massey and Pren, 2012; Krogstad et al., 2018).

This may be especially true in California over the period we study, which saw a large increase in low-income immigrants (Sun-Hee Park et al., 2000). Net undocumented immigration started at relatively low levels in the early 1980s, but surged during the mid- to late-1980s, followed by a sharp decrease in the early 1990s (Johnson, 1996). We document these relevant changes in the number and composition of immigrant women of reproductive age using data from the 2000 Census. Appendix Figure A1 traces out changes in the number of immigrant women in California by year of entry to the US, place of birth, and education level. As may be seen in this figure, there is a large increase in the number of immigrants from Central America and the Caribbean over the period we study. In addition, there is a noticeable increase in women immigrants with lower levels of educational attainment during this period.

These demographic changes are expected to change the composition of women giving birth over the study period. Such changes are difficult to address using standard birth data, which contain very limited data on maternal characteristics, including country of origin, no information on date of entry to the United States, nor identifiers that allow for linkages across common parents. Not adequately controlling for these types of compositional changes may lead to biased estimates of any program effects as a result; as such, this is an inherent limitation of existing studies on this topic.

In addition to this limitation, it can also be difficult to identify the targeted population of any coverage expansions. There is no information on the citizenship or legal residency status of the mother

on birth certificate records, nor information on her income or socioeconomic status to determine eligibility for expanded coverage.[17] With this information absent from the birth record, studies relying on birth certificate records have been limited to examining changes in outcomes for all immigrant women, or some subset of these women such as those with low education levels, which could also make it difficult to detect program effects.

This paper builds on this small existing literature by offering new evidence on the effects of public prenatal coverage for undocumented immigrant women. Given its historic size and the number of women covered, the Medi-Cal expansion provides a promising setting to detect program impacts. Our study also takes advantage of new data linkages to overcome several empirical challenges: we are able to observe changes in health insurance coverage, utilization, and health outcomes among births to the same mother before and after the expansion, thereby holding fixed the composition of immigrant mothers. We use rich survey data to identify immigrant mothers who are most likely to have undocumented status and therefore benefit from the expansion. We also use survey information to explore and rule out the potential role of concurrent changes in immigration policy in explaining our findings. Finally, we are able to examine the trajectories of our outcomes for several years before and after the expansions occurred, allowing us to assess the validity of our approach and to document dynamic effects of the policy over time.

2 Data and Outcomes

Our analysis of the effects of the undocumented Medi-Cal expansion uses a novel data source that links confidential California birth records for children born between January 1984 to October 1994 to the 2000 Census and the 2001-2011 years of the American Community Survey (ACS).[18] The full name of the infant, gender, exact date of birth, and county of birth are used by the Census's Person Identification Validation System (PVS) to assign a Protected Identification Key (PIK) to each individual birth record. This PIK is assigned by comparing individual-level information on the birth certificate input file to the characteristics of records in PVS reference files held by Census. Once assigned a PIK, we use this anonymized individual ID number to link across Census-held data without the retention of personally identifying information. The overall match rate for the California birth records during the years of our study is 97.2 percent overall and 96.2 percent for births to immigrant mothers, which

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[17]California birth records only started including information on the educational attainment of the mother in 1989.

[18]We define the post-period through October 1994 in order to limit the analysis to the period prior to Proposition 187, which may have had chilling effects for immigrants in California. See prior discussion in Section 1.

are comparable to the match rates of federal data sources (Mulrow et al., 2011). Appendix Table A1 reports the characteristics of births over this period with and without an assigned PIK.

We construct our analytic sample using family relationship information from the 2000 Census and 2001 to 2011 waves of the ACS. Combined, these surveys include observations for about 13 percent of births during our sample period.[19] For children whose families were included in these surveys, we are able to identify siblings as those individuals of 17 years of age or younger who are residing at home with the same mother. See Appendix Section C for additional details on this process. Note that without this linkage to the Census and ACS, it is not possible to otherwise link siblings in the birth records who were born before and after the policy change, since mothers' full identifying information was only recorded on the birth record starting in 1989, or the "post" period.[20] We then restrict the sample to siblings born to mothers during the study period. We also require that the mother reside in the state of California at the time of each birth and that the birth record includes information on her place of birth.[21] This leaves us with a sample of approximately 360,000 siblings born to 161,000 unique mothers.[22]

Our analysis is necessarily limited to children who were born in California during the study period and who lived in the U.S. at some point between 2000 and 2011 in order to be surveyed in the Census or ACS. Therefore, our estimates of the program's impact will not include effects for mothers or their children who leave the U.S. following birth or during early childhood. In addition, our estimates are based on individuals whose families are sampled and respond to the Census/ACS, which may also miss some types of immigrant families. Appendix Table A2 compares the characteristics of births to all immigrant mothers during our study period to those that receive PIKs and are included in the Census/ACS sample. The children that appear in the survey are more likely to have Asian mothers and less likely to have Hispanic mothers. Notably, the mothers of the children in the survey sample use more medical care during pregnancy and have better birth outcomes. Depending on how the mothers of children who were excluded from our sample benefited from the Medi-Cal expansion, we may be either under- or over-stating the overall impact of the policy based on our sample alone.

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[19]This refers to the percent of births records from January 1984 - October 1994 with a PIK and in the survey data. Rates of coverage are roughly similar for births to immigrant and U.S.-born women at 12.2 and 13.2 percent, respectively.

[20]Using the post-1989 years of data, we are able to validate the accuracy of the sibling identification procedure used. We find that the mother is misidentified in a very small number of cases (see Appendix Section C).

[21]We also exclude birth records with missing information on mother's county of residence, birth order, parity, or sex of the child. Less than 0.01 percent of birth records are dropped under these exclusions.

[22]There are approximately 59,000 immigrant mothers and 102,000 US-born mothers. All numbers have been rounded to comply with Census disclosure avoidance rules.

Later, we construct representative weights based on the universe of births observed in the birth certificate data that we apply to our Census/ACS sample. To the extent that treatment effects vary only in the observable characteristics used in the construction of these weights, this procedure will generate program effects that are representative of the population of births in the state.

Table 1 presents characteristics of the infants in our sample overall and by mother's place of birth. The majority (69 percent) of infants are either the first or second born siblings. The infants predominately have mothers whose race is white. A large share of infants (37 percent) have mothers of Hispanic ethnicity. Approximately 37 percent of the infants have immigrant mothers; of these infants, the majority of their mothers were born in Mexico. Mother's age at the time of birth is similar for all infants (27 years on average). Births to immigrant mothers receive less health care during pregnancy and are less likely to be delivered by a physician. Gestation length and birth weight are also lower compared to births to U.S. born mothers.

While we do not have information on the educational attainment of the mothers or their family structure at the time of birth, we observe this information later in the linked Census/ACS data. The information in the surveys is observed approximately 11 years later, on average. The majority of children (69 percent) reside in married parent families at this time. This share is higher among children of immigrant mothers. In addition, the majority of children of immigrant mothers (54 percent) have mothers with less than a high school degree, compared to just 11 percent of children of U.S. born mothers.

In our main analyses, we first analyze the effects of the Medi-Cal prenatal expansions among all immigrant women and their children. We then use additional characteristics of the mother drawn from the Census and ACS to examine the effects of the expansions for the infants born to mothers most likely affected by the policy change. We estimate the probability that each immigrant mother was an undocumented immigrant around the time of the policy change using a procedure described in Section 3.

Appendix Table A3 provides descriptive statistics for immigrant mothers in the sample by the mother's likely undocumented status.[23] Mothers with a higher estimated probability of undocumented status are more likely to be white, Hispanic, and born in Mexico. They also are younger at the time of birth, have lower education levels, and are slightly more likely to be married at the time of the Census/ACS interview.

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[23]Note that some estimates in this table are not reported because the implied cell size did not meet Census disclosure rules. These entries are left blank.

2.1 Changes in Eligibility and Insurance Coverage

We do not have the information on maternal income at the time of pregnancy needed to estimate individual eligibility for Medi-Cal prenatal coverage. However, we are able to examine changes in the fraction of women of reproductive age eligible for Medi-Cal prenatal coverage in each woman's county of residence using information on California residents from the 1990 Census.[24] We construct county-level measures of eligibility for immigrant and US-born women during each month and year over our sample period (see Appendix Section A for additional information on the eligibility calculation), which we merge onto the California birth records. For analyses that examine changes in eligibility for likely undocumented immigrant mothers, we use separate county-level measures of eligibility for legal and undocumented immigrants that are merged on using the mother's estimated probability of undocumented status.[25] Given that we use a fixed sample of women drawn from the 1990 Census to estimate time-varying eligibility, any changes in eligibility observed in this analysis will reflect changes in Medi-Cal eligibility rules, rather than other demographic or socioeconomic changes. First developed by Currie and Gruber (1996a,b) and Cutler and Gruber (1996), this type of "simulated eligibility" measure is commonly used to summarize policy-induced changes in the generosity of eligibility rules for Medicaid.

For the analyses that examine changes in individual insurance coverage, we use information from the birth certificate record on the principal source of payment for prenatal care, which was collected starting in 1989. While these data are limited to the "post" period of the Medi-Cal expansion, they allow us to trace out changes over time in Medi-Cal funded prenatal care relative to the the first year of policy exposure. We might expect this to potentially attenuate our estimated effects of the policy change, but the estimates may not be that far off from the policy's full impact given that only births starting in July 1989 would have a full 9-months of pregnancy exposure to the expansion, which was implemented in October 1988.[26]

In Appendix Section D, we examine the expected principal source of payment for deliveries over the entire period using Patient Discharge Data (PDD) from the California Department of Health Care Access and Information (HCAI), formerly the Office of Statewide Health Planning and Development,

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[24]Note that only 34 counties are identified in the 1990 Census; however, these counties represent over 98 percent of the births in the state during our study period. For the 24 non-identified counties, we use the estimate of the eligibility change among respondents with non-identified counties in the 1990 Census.

[25]Specifically, for these analyses, we construct an eligibility estimate for each immigrant mother using the formula $\hat{p} *$ Eligibility for undocumented immigrant women$_{ct} + (1 - \hat{p}) *$ Eligibility for legal immigrant women$_{ct}$, where $\hat{p}$ is the mother's estimated probability of undocumented status, c indicates county, and t indicates the month and year.

[26]In these analyses, we effectively use January 1989 to September 1989 as the "pre-" period.

linked to the birth certificate records. Although the intervention of interest for the outcomes we study is primarily related to prenatal, not delivery-related, coverage, this measure is available in both the pre- and post-period, which allows us to trace out any immediate changes following the policy change.

2.2   Changes in Health Care Utilization and Birth Outcomes

We examine changes in the use of any prenatal care during pregnancy and the use of prenatal care in the first trimester, as well as the location of delivery (hospital vs. non-hospital, type of hospital), method of delivery (cesarean section vs. vaginal birth), and type of attendant (doctor vs. midwife), using information from the birth certificate record. While changes in delivery care are unlikely to affect the birth outcomes we study, they might reflect more general changes in interactions with the health care system that were likely initiated earlier during pregnancy (such as establishing care with a physician), which could matter for pregnancy outcomes.

To evaluate infant health, we examine average birth weight and gestational length, as well as whether the infant is small for gestational age (birth weight is below the 10th percentile for a given gestational age).[27] In additional analyses, we examine changes in the distributions of birth weight (by 500g bins) and gestational length (early preterm: < 34 weeks, late preterm: 34-36 weeks, early term: 37-38 weeks, full term: 39+ weeks).

3   Empirical Strategy

As described in Section 1.4, we aim to overcome existing empirical challenges in identifying the effects of expanded prenatal coverage for immigrant women by taking advantage of additional information available in the linked Census/ACS data. Specifically, information on family relationships allows us to examine differential exposure to the undocumented expansion across siblings for the same mother, based on their time of birth. We are able to compare differences in outcomes observed for these siblings with other siblings who were either born entirely before or after the policy change, in order to net out birth order effects. We also include children of U.S. born mothers in the analysis as an additional comparison group. Similar approaches combining policy-variation with a family fixed effects design have previously been implemented to study access to WIC in Texas (Rossin-Slater, 2013), expansion in pre-primary education in Uruguay (Berlinski et al., 2008), a public prenatal intervention in Chile (Clarke et al., 2020), and the Head Start program in the U.S. (Currie and Thomas, 1995; Deming, 2009;

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[27]We exclude observations with reported birth weights of less than 400 grams or more than 6000 grams from any analyses of birth weight. We also exclude observations with reported gestation lengths of less than 18 weeks or over 50 weeks from the analyses of gestational length. Cutoffs for the small-for-gestational age measure are calculated for each birth year.

Miller et al., 2021). Most directly related to this paper, Aizer et al. (2007) use a similar research design to examine the impact of a change in the mid-1990s in Medi-Cal pregnancy coverage from fee-for-service to managed care.

Our research design relies on an assumption that in the absence of the Medi-Cal expansion to undocumented immigrant women, outcomes among the children of immigrant and U.S.-born women would have evolved similarly, after accounting for fixed differences in the characteristics of their families via a mother fixed effect. While this assumption is not directly testable, we examine whether the pre-treatment trends are similar for the children of immigrant and U.S.-born women using an event study design. If trends are similar prior to the intervention across the two groups and diverge only after the policy change, this pattern lends credence to the assumption that the children of U.S.-born mothers are an appropriate counterfactual for the children of immigrant mothers.

In addition to investigating the plausibility of our identifying assumptions, the event study design offers another advantage in that it allows us to test for time-varying treatment effects. In our specification below, we consider the policies to "turn on" for children born during the implementation year. However, the effects of the policy change may not always be observed immediately for several reasons. First, some of the outcomes studied are unable to or unlikely to have immediate effects. For example, none of the births occurring during the six months following the policy change were able to benefit from increased prenatal care access during the first trimester, since this period had already passed when the policy went into place. And, prenatal interventions received later in the gestational period may be less likely to affect certain birth outcomes. Second, for many of the outcomes, it may be the case that it took time for the newly eligible to learn about the policy change, enroll in the program, and initiate care. These types of informational and administrative barriers to take-up have been previously documented in Medi-Cal and are higher among groups facing language barriers or immigration-specific considerations (Aizer, 2007). Third, the state made several changes following the policy change to make it easier for women to enroll in the program.[28] These were state-wide changes but may have differentially affected take-up among immigrant women and contribute to a potential ramp up in the expansion's impact over time. For example, Aizer (2003, 2007) documents that later

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[28]California adopted several improvements to their Medicaid enrollment systems in an effort to increase coverage among eligible pregnant women. These types of changes during the study period including expedited eligibility processes (January 1989), outstationed eligibility workers at high-volume clinics (May 1990), continuous eligibility during pregnancy and the postpartum periods despite changes in income (January 1991), shortened application forms (November 1991), and presumptive eligibility for pregnant women that allowed women to receive services while their application was pending (1993). In addition, the state launched a media campaign called Baby-Cal designed to disseminate information about Medi-Cal and the importance of prenatal care (July 1991). General descriptions of these state efforts are available in Hill (1992), California Department of Health Care Services (2016), and Dubay et al. (1995).

state outreach efforts to increase Medi-Cal take-up had larger effects on Hispanic and Asian families, who faced greater barriers related to language or immigration concerns.

We implement the event study analysis using the following specification:

$$y_{imt} = \sum_{\substack{y=-5 \\ y \neq -1}}^{6} \beta_y I(t - \text{Oct. } 1988 = y) \times Immigrant_m + \delta_t + \delta_m + \gamma X_{imt} + \epsilon_{imt}. \qquad (1)$$

We regress outcomes for births (i) to U.S. and immigrant mothers (m) in month-year (t) on month-year (δ_t) and mother fixed effects (δ_m). We control for the following characteristics of birth (X_{imct}): sex, plurality, and the sibling birth order (first birth, second birth, third birth, fourth birth or higher). We cluster the standard errors by mother.

The estimated coefficients β_y trace out the evolution of outcomes for births to immigrant mothers compared to U.S.-born mothers, conditional on the mother fixed effect and other birth characteristics, relative to the implementation of the undocumented expansion. These are estimated using an indicator for immigrant mothers interacted with an indicator for each year relative to the implementation date of October 1988.[29] The year just prior to implementation ($y = -1$) is the excluded year for each set of event coefficients. Estimates for β_y for years prior to $y = 0$ should be close to zero if there are no differential pre-expansion trends in outcomes for the two groups of births. We would expect the outcomes to diverge starting with β_0 if there are effects of the policy change.

In addition to the event study specification, we also estimate the effects of the expansion using a difference-in-differences comparison. This gives an estimate of the average effect of the policy over the entire post-expansion period. It is equivalent to the specification above except that the event study coefficients are replaced with an indicator variable for immigrant mothers during the post-period.

3.1 Variation in Likely Undocumented Status at Time of Policy

The estimates in the analysis described above tell us the impact of the Medi-Cal expansion for the children of all immigrant mothers. To estimate effects for the immigrant women and children most likely to benefit from the policy change, we take advantage of the rich information available in the linked Census/ACS survey data. While these surveys do not collect information on the legal status of non-citizens, they do have detailed information on the mother's country of birth and her year of entry in the U.S. Combining this information with her age and county of residence, we estimate the

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[29]Note that β_{-5} signifies 5 calendar years before the undocumented expansion and includes births occurring between January and September in 1984. Meanwhile, β_6 captures births that occurred in October 1994 only. Since these represent only partial years, we do not report them in the event study figures.

individual likelihood that each immigrant mother had undocumented status at the time of the policy change in order to estimate the effects for the policy's targeted population.

To do this, we use a prediction model estimated with publicly available 1990 Census data that also relies on imputed individual undocumented status using the Borjas algorithm mentioned earlier (also see further details in Appendix Section B). We first estimate the probability of undocumented status among immigrant women with young children in the 1990 Census as a function of time-invariant characteristics: country of birth, year of entry in the U.S, age in 1990, and county of residence. The coefficients from this model are then applied to the same characteristics observed for the mothers in our linked sample to predict the probability that they were undocumented in 1990. More details on this procedure are available in Appendix Section E. We then interact this estimated probability with the event time dummies in equation (1) and the post-treatment dummy in the difference-in-differences model. The estimated coefficients from these specifications provide an estimate of the effect of the policy for an undocumented mother and her infant. In order to account for the additional estimation required in constructing the mother's likely undocumented status, we estimate the standard errors using a bootstrapping procedure that first resamples the 1990 Census to estimate the probability of undocumented status and then resamples the birth records by cluster to estimate the regression models described here.

4   Results

4.1   Medi-Cal Eligibility and Coverage

We begin by examining the changes in Medi-Cal eligibility and prenatal coverage resulting from the undocumented expansion. Figure 2(a) presents the estimated event study coefficients for Medi-Cal eligibility. We see a large jump in the first year of the policy, estimating approximately a 17 percentage point increase in county-level Medi-Cal eligibility for immigrant mothers, when compared to US-born mothers. This increases to 23 percentage points in the next year, following the income-based eligibility expansions discussed in Section 1, and remains flat over the remainder of the study period. Column (1) of Table 2 reports the difference-in-differences coefficient indicating an average increase in eligibility of 21.6 percentage points over the entire post-period.

Panel (b) of Figure 2 shows the event study estimates for Medi-Cal prenatal coverage. The change in Medi-Cal coverage is immediate but continues to climb over the study period, appearing to stabilize during the fifth year that the policy is in effect. The difference-in-differences estimate (column (2)

of Table 2) indicates a 16.8 percentage point increase on average during the post-period. Because we measure the increase in prenatal Medi-Cal coverage relative to a partially treated year, the true increase in Medi-Cal prenatal coverage due to the policy may be even larger.

A similar pattern is seen in the analyses that focus on likely undocumented immigrant women, as reported in Appendix Figure A2 and panel (B) of Table 2. We estimate an average increase in eligibility of 64 percentage points during the post-period, accompanied by a 37 percentage point increase in Medi-Cal prenatal coverage. Appendix Figure A2(b) again indicates that enrollment increases over the study period with the largest effects observed in years 3 to 5 following the expansion.

Figure 2 and Table 2 also show results for uninsurance, private insurance, and other sources of coverage for prenatal care. The drop in uninsurance for immigrant women following the first year of the policy (panel c of Figure 2) is of similar magnitude to the increase observed in Medi-Cal prenatal coverage. The difference-in-differences estimate indicates an average decrease of 15.1 percentage points among all immigrant women during the post period, with a 36.7 percentage point decline among likely undocumented women (column (3) of Table 2). We observe only very small changes in private coverage and other sources of coverage; see columns (4) and (5) in Table 2. In general, other sources of coverage do not tend to be very relevant for prenatal care, reported for only 2.7 percent of immigrant women at baseline.

Overall, the estimates show substantial declines in uninsurance for immigrant women for prenatal care following the Medi-Cal expansion in eligibility for undocumented immigrant women. In contrast to studies of the income-based expansions of Medicaid during this period (e.g. Cutler and Gruber, 1996; Dave et al., 2011), we do not find meaningful evidence of crowd-out of private coverage. This may be unsurprising given that private coverage is predominately employer-sponsored (Cohen et al., 2009), and undocumented immigrants are overrepresented in low-skilled occupations that tend not to offer these benefits (Fortuny et al., 2007). We also do not find that this expansion merely served to crowd out other sources of public coverage.

In Appendix Section D, we also examine changes in Medi-Cal delivery coverage as reported in linked administrative hospital records. In that analysis, we continue to see evidence of large changes in Medi-Cal coverage for deliveries to immigrant women following the undocumented immigrant expansion. However, there are also some smaller changes in insurance coverage for delivery care predating the policy, which we suspect were related to EMTALA or other policy changes regarding emergency care. Since our focus is on exposure during the prenatal period, we focus our first stage

analysis on the coverage changes for prenatal care presented here but direct interested readers to further details in the Appendix.

4.2 Health Care Utilization

Next we examine changes in health care utilization among immigrant mothers in terms of prenatal and delivery care. Figure 3 reports the coefficient estimates from the event study analysis for all immigrant women (comparable graphs for likely undocumented women are reported in Appendix Figure A3), while Table 3 reports the corresponding difference-in-differences estimates for all immigrant women (panel A) and likely undocumented immigrant women (panel B). Of note, the baseline means for the likely undocumented subset of women indicate that this group had lower rates of prenatal care use, later initiation of prenatal care, and was less likely to have a physician attended delivery than the full sample of immigrant women.

As seen in Figure 3, there is little evidence of differential trends in utilization for immigrant and U.S.-born women prior to the Medi-Cal expansion. However, there is an immediate increase in the use of prenatal care by immigrant women after the policy change. In the first year of implementation, there is a 0.5 percentage point increase in any prenatal care utilization. Mirroring the increase in the policy's dynamic effects on prenatal Medi-Cal enrollment, the effect of the policy on use of prenatal care grows over time, reaching over a 1 percentage point increase in the program's second year and over a 2 percentage point increase by its fifth year. The difference-in-differences estimate summarizes the post-period change as a 1.1 percentage point increase for all immigrant women, which is approximately the size of the gap in prenatal care use observed between immigrant and U.S.-born women in our sample (see Table 1). For likely undocumented immigrant women, we find a 2.5 percentage point increase in any prenatal care use after the policy change. This represents approximately a 64 percent reduction in the share of undocumented immigrant women without prenatal care during the baseline period, which was 3.9 percent (see Table 3).

We also see some evidence of an increase in early prenatal care utilization (i.e. initiation during the first trimester). This effect, however, is delayed and does not emerge until the fourth year of program implementation (see Figure 3). We would expect there to be a delay for this particular outcome, since it requires women to know about and enroll in the program at the start of their pregnancy. However, this seems like a particularly long lag and indicates that immigrant women may still have faced barriers to enrollment during their first trimester. The later increase may be related to other state efforts

to increase awareness of the importance of prenatal care and Medi-Cal eligibility starting in 1991,[30] as well as the adoption of a presumptive eligibility policy in 1993. The estimates for the fourth, fifth, and sixth year of implementation indicate increases in early prenatal care receipt of 2, 4, and 5 percentage points, respectively, which represent between 6 and 16 percent decreases in the baseline share of immigrant women without early prenatal care. The difference-in-differences estimate, which provides an average effect over the entire post-period, is smaller at 1.1 percentage points for all immigrant women, and 3.9 percentage points for likely undocumented immigrant women.

Next we examine changes in delivery care. We find evidence of an increase in hospital deliveries for immigrant women following the policy change. This change is statistically significant beginning in the third year that the policy is in effect; the point estimates range from 0.3 to 0.6 percentage point increases relative to the year just prior to implementation. The difference-in-differences estimate indicates a 0.3 percentage point increase over the entire post period, which represents a 43 percent reduction over the baseline share of immigrant women without hospital deliveries (see Table 3). We also examined whether the birth is more likely to occur in a public hospital, as opposed to a private hospital. While our estimates indicated a decrease in deliveries at public hospitals among immigrant mothers, we also observed a strong pre-trend for this outcome.[31]

We also looked at whether the birth was delivered by a doctor (as opposed to a midwife or other type of attendant) and the rate of c-section delivery. We find evidence of a significant increase in doctors delivering the births of immigrant women starting in the second year of the policy. The difference-in-differences estimates indicate a 1.7 percentage point increase in doctor deliveries for all immigrant women and a 5.4 percentage point increase for likely undocumented immigrant women. This represents a 47 percent decrease in the share of likely undocumented immigrant women with midwives or other attendants, as measured during the baseline period. We find no evidence of a change in the likelihood of a c-section associated with the Medi-Cal expansion.

4.3 Birth Outcomes

Next we examine the effects of the Medi-Cal expansion on birth outcomes for immigrant women. We estimate whether there were changes in gestational length, birthweight, and the incidence of small

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[30]The BabyCal informational campaign was initially launched in July 1991 and expanded beginning in November 1992. It featured TV and radio ads and billboard advertisements with the messages "Get prenatal care. The State of California can help you," or "Take care of yourself while pregnant, your baby is counting on you" along with a state hotline number. Ads were targeted to Spanish language outlets in addition to English language outlets (Department of Health Services, 1992).

[31]It appears that births to immigrant women in public hospitals were already decreasing relative to those of U.S. born women prior to the policy change, possibly due to the Emergency Medical Treatment and Labor Act (EMTALA), which required hospitals to admit women in labor regardless of her ability to pay for services.

for gestational age under the policy. The event study estimates are reported in Figure 4 (Appendix Figure A4 for likely undocumented immigrant women) and the difference-in-differences estimates in Table 3. As seen from the baseline means in this table, gestational lengths were similar for all infants to immigrant mothers and the subset born to likely undocumented immigrant mothers. However, the infants of likely undocumented women had lower birthweights on average, and were more likely to be small for gestational age.

The event study estimates reveal changes in all three measures of health at birth that are increasing over time. We find little evidence of differential pre-trends in outcomes prior to the policy change. The difference-in-differences estimates indicate a 22 gram increase in average birthweight, an increase in gestation length of 0.6 days, and a 0.8 percentage point decrease in small for gestational age among births to immigrant women. This latter estimate represents a 9 percent decrease in prevalence relative to the baseline mean (8.9 percent). The estimates for likely undocumented immigrants are approximately 2.5 or 3 times larger.

In additional analyses, we examine distributional changes in birthweight and gestation length under the policy. In the first panel, Figure 5 presents estimates for birthweight that examine changes by 500 gram bins. Two bars are shown for each birthweight bin, where the first represents the baseline distribution for immigrant mothers and the second shows the estimated change after the policy.[32] As may be seen here, there were significant changes in the proportion of births in several of these categories. Specifically, the birthweight distribution shifted to the right after the policy change, decreasing the number of births with birthweights between 2500 and 3499 grams and increasing the number of births with birthweights of 3500 grams and greater. We do not find evidence of significant changes in the low birthweight range (<2500 grams).

In the second panel of Figure 5, we report estimates for changes in the distribution of gestational length. Consistent with our results on the birthweight distribution, we find a shift in births from early term (37-38 weeks) to full term (39 weeks+) under the policy change. We do not find significant effects on the frequencies of early and late preterm births. The patterns are identical when using the estimates for likely undocumented immigrant mothers (see Appendix Figure A5).

Note that the nature of these shifts is consistent with the finding of a decrease in small-for-gestational age. The median birthweight for infants with the small-for-gestational age designation during our study period is 2660 grams, above the low birthweight threshold of 2500 grams, while the

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[32]This is estimated by adding the difference-in-differences estimate (and its confidence interval) to the baseline mean.

median gestation length is 39 weeks.

4.4 Sensitivity Analyses

To assess the sensitivity of our results to alternative specification and sample criteria, we present several additional estimates in Appendix Table A4 (for all immigrant women) and Appendix Table A5 (for likely undocumented immigrant women). The first row in each table presents the difference-in-difference estimates from our main specification. The next three rows show results from analyses with additional control variables. In row (2), we add county by month-year fixed effects ($\delta_c \times \delta_t$) to control for county-specific changes in outcomes over time. In row (3), we also include immigrant mother by county fixed effects ($Foreign_m \times \delta_c$) to control for any fixed differences across counties by immigrant status. The inclusion of these controls aim to address any concerns, for example, that there are concurrent changes in the local healthcare infrastructure or environment that differentially affect the localities of immigrant and U.S. born women, or that either group of women are relocating between births to lower or higher resourced counties in a manner coinciding with the policy change. The estimates are extremely similar for all outcomes, with the exception of the early initiation of prenatal care, which becomes smaller in size.

In row (4) of the tables, we assess the sensitivity of our findings to controlling for the income-based Medi-Cal expansions that took effect during the 15-month period following the expansion to undocumented immigrants, as described in Section 1. To conduct this analysis, we use a county-level measure of the change in eligibility that resulted from the income expansions as a measure of exposure to the policy change. This measure is constructed by estimating the change in eligibility for women of reproductive age in the event of a pregnancy using county characteristics from the 1990 Census.[33] Appendix Figure A6 shows the change in eligibility under the income expansion for each county; the eligibility gain associated with the income expansion ranges from 9.5 percentage points to 22.6 percentage points across counties. We re-estimate the model including this county-level eligibility gain interacted with an indicator variable for the period following the income-based expansions. We also include county by immigrant fixed effects ($Immigrant_m \times \delta_c$) and controls for time-varying county economic and policy characteristics during this period (Z_{ct}) that might influence fertility or infant

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[33]Specifically, the eligibility gain is calculated as the difference in county-level eligibility using eligibility rules from January 1990 compared to June 1989, the month just prior to the first expansion that occurred in July 1989. Additional details on this eligibility determination may be found in Appendix Section A. As mentioned earlier, not all counties are identifiable in the 1990 Census. For those counties that are unable to be identified, we use the estimate of the eligibility change for respondents with non-identified counties.

outcomes.[34] We cluster the standard errors at the county level. As seen in row (4), the point estimates under this specification are extremely similar to the main analysis, with the exception of early prenatal care, which again is smaller in size.

In row (5) of the tables, we re-run our main analyses and apply weights to account for differential sampling rates in the Census survey data. As described in Section 2, our analysis sample is necessarily limited to children who were born in California during the study period and who also lived in the U.S. at some point between 2000-2011 in order to be surveyed by the Census Bureau. In addition, to be included in our analysis, it also had to be the case that their family was sampled and responded to either the 2000 Census or 2001-2011 ACS. The analysis of our linked data, therefore, does not provide any information on program effects for children who left the U.S. during early childhood, or for other types of families not captured in the survey data.

While the impacts for these missed groups are unknowable without additional sources of data, we are able to take advantage of the fact that we observe the population of California births–not just survey respondents–in our birth certificate data. Using the data on all California births, we are able to estimate what the overall program effects would be if the effects are similar for all children in the state with a given set of observable characteristics, which we select based on their availability for all birth records. The weights are equal to the inverse ratio of the number of individuals in our linked sample to the population of births in the state in each cell defined using birth year, birth month, birth order, mother's ethnicity and race, mother's country of birth, sex, plurality, mother's age, and county of residence. As seen in row (5) of Appendix Tables A4 and A5, the estimates are very similar when we apply these weights.

Next, in row (6), we explore the potential role of concurrent immigration reforms by dropping women who were likely to directly benefit. If these reforms changed a mother's legal status or those of other family members, this may have had effects on her well-being, as well as that of her offspring. This is a concern for our research design if these changes are implemented at the same time as the Medi-Cal expansion since they differentially affect immigrant women.

There were two important federal immigration reforms during this period. First, the Immigra-

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[34]These are the county unemployment rate, income per capita, and government transfers per capita (retirement and disability insurance benefits, income maintenance benefits, education and training assistance, and unemployment insurance compensation). Data on county unemployment rates from the Bureau of Labor Statistics, while income per capita is constructed from the Bureau of Economic Analysis Regional Economic Accounts. Government transfers per capita are from data assembled by Hoynes et al. (2016) from the Bureau of Economic Analysis Regional Economic Information System. In addition, we include a county-year control variable for the presence of the Comprehensive Perinatal Services Program, an enhanced prenatal services program for Medi-Cal recipients (Korenbrot et al., 1995).

tion Reform and Control Act (IRCA) became law in November 1986. It increased enforcement against unauthorized immigrants at the southern U.S. border, penalized employers for knowingly hiring undocumented workers, and created an amnesty program for some undocumented immigrants to become legal U.S. residents. Individuals who had been living continuously in the U.S. since January 1, 1982, as well as special agricultural workers who had been employed in the U.S. for 90 or more days between May 1985 and May 1986, were eligible to apply for legalization (Norton et al., 1996).

Second, the 1990 Immigration Act (IMMACT) provided protection from deportation and work authorization for spouses and unmarried children who were related to legal immigrants, including newly legalized IRCA immigrants, and who entered the United States without legal status prior to May 5, 1988. The law also provided immigrant visas for the spouses and children of legalized immigrants who had attained permanent resident status (Guendelsberger, 1992).

To explore the potential role of these concurrent reforms, we re-run our analyses dropping immigrant women who entered the U.S. prior to January 1, 1982, since this indicates that they may have been eligible for IRCA legalization. We also excluded women who resided with a spouse who entered the U.S. prior to this date, since she and any existing children may have benefited either indirectly from his IRCA legalization, or from the later family unity policy described above.[35]

The results of this analysis are reported in row (6) of Appendix Tables A4 and A5. The estimates are similar to those for the main sample. In fact, they are slightly larger in magnitude in most cases, indicating that the effects of the expansion may have been smaller for the IRCA eligible immigrants and their families.

Finally, in Appendix Table A6, we re-run our analyses for the sample of births to immigrant women only, using variation in the estimated likelihood of undocumented status as a measure of treatment. This model does not rely on the U.S. born mothers as a comparison group and instead compares immigrant mothers whose characteristics made them less versus more likely to have undocumented status at the time of the policy. Our results overall are very similar to our main analysis, although some of the estimates are slightly smaller in magnitude or less precise, due to the smaller sample sizes.

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[35]We did not attempt to classify workers as IRCA eligible based on their occupation since it was not clear that this information at the time of the ACS/Census interview would accurately reflect 90 days of agricultural work during the year required under IRCA requirements.

5 Additional Analyses: Exploring Mechanisms

5.1 Fertility Changes

To further probe the changes in birth outcomes under the undocumented expansion, we first conduct additional analysis to explore whether there were any changes in fertility associated with the policy change. This policy could plausibly affect fertility in two ways. First, to the extent that the additional prenatal care improved maternal and fetal health, it could prevent miscarriages or stillbirths, resulting in more live births for a fixed number of pregnancies. Second, it could affect births through the number of pregnancies carried to term, increasing births even if rates of pregnancy loss did not change. This could occur if Medi-Cal prenatal coverage reduced the costs (both monetary and otherwise) associated with pregnancy and childbirth, making pregnancy more appealing and resulting in more conceptions and/or fewer abortions. Changes on either of these margins could lead to changes in average birth outcomes, depending on the average health of the "marginal" child.

While prior work finds limited or no evidence of fertility responses to Medicaid prenatal expansions (e.g. Zavodny and Bitler, 2010; DeLeire et al., 2011; Groves et al., 2018), effects may differ in our setting given the population we study, so we examine changes in fertility directly. In the context of our analysis, the sample is comprised of births with at least one sibling born during the study period. Therefore, any changes in fertility associated with the policy would most directly affect sample composition, and therefore our policy estimates, by changing a mother's decision to have (or timing) of a subsequent birth.

To investigate this, ideally, we would have data on women's conception decisions, abortions, and pregnancy loss over the study period. Given that these type of data are unavailable, we explore fertility responses by evaluating changes in birth rates. Specifically, we examine whether, conditional on having an initial birth during the study period, there are changes in subsequent birth rates following the policy change. We construct a panel dataset for every mother identified in the linked birth-ACS/Census records with information on whether they gave birth during each month and year following their first observed birth. Changes in observed birth rates will therefore capture the net effect of both changes in health during pregnancy and changes in desired fertility.

As seen in the first column of Table 4, we find a statistically significant increase in subsequent births among immigrant mothers associated with the Medi-Cal expansion (event study estimates may be found in Appendix Figures A7(a) and A8(a)). Our estimates suggest a 0.1 percentage point increase

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in the likelihood of a subsequent birth among immigrant mothers with at least one child, a 14 percent increase over the observed baseline rate. Since 28 percent of births in our sample are first births, this increase in subsequent births implies a meaningful increase in the overall birth rate of about 10 percent (0.28 + 0.72*1.14=1.10), with these marginal births representing about 9.1 percent of all births in the post-expansion era.[36]

If these births are more likely to be healthier than the average birth among this population, then this increase in childbearing is one potential mechanism behind the improvements in birth outcomes documented under the policy change. To examine how much of our policy effect might be attributable to this mechanism, we conduct a bounding exercise that assumes that all marginal births receive prenatal care, have higher than average birth weight (3500 grams) and experience a 40 week gestation.[37] This procedure implies that selection due to changes in childbearing can, at most, explain 20.0% (prenatal care usage), 40.3% (birthweight), and 14.7% (gestation length) of the policy effect when examining changes among immigrant women. Furthermore, this analysis implies that it is possible that changes in fertility fully explain the policy effect if no marginal births were small for gestational age. We observe larger fertility effects among likely undocumented mothers, and these can explain a larger fraction: at most 52.6% of the prenatal care usage, 74.8% of the birthweight effect, 25.2% of the gestation length effect, and again the full small for gestational age effect. It is important to note that these are upper bounds that assume all marginal births are maximally healthy and receiving prenatal care; in reality, marginal births may in fact be negatively selected (e.g. if they result from averted miscarriages that lead to less healthy infants). Therefore, while a potentially important mechanism and an interesting outcome in its own right, changes in fertility do not appear to be the sole mechanism underlying the effect of the Medicaid expansion for most of the key outcomes we consider.

5.2 Access to Care and Health During Pregnancy

We next supplement our main analysis with an additional measure of prenatal care use available in the birth records starting in 1989 - the number of prenatal visits. Similar to the first stage analyses of changes in prenatal insurance coverage, we examine changes in this outcome relative to January 1989 through September 1989, during the first year that the policy was in effect. As seen in the second

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[36]Normalizing the number of pre-period births to 1, marginal births are 0.72*0.14=0.1008. When compared to the post-policy period, these births represent about 9.1 percent of all births (0.1008/(1.14*.72+0.28)).

[37]We assume there were no policy effects other than the change in selection. We use the fact that marginal births represent 9.1 percent of all post policy births and calculate the pre-post policy change among immigrants as $\bar{Y} - (\bar{Y} \times 0.909 + \bar{V} \times 0.091)$, where $\bar{Y}$ is the pre-policy average for the immigrant group and $\bar{V}$ is our imposed "healthy" outcome (receiving prenatal care, birth weight of 3500 grams, or 40 weeks gestation). We then compare this "selection effect" to the policy effects estimated in Table 3.

column of Table 4, we find a significant increase in the number of prenatal visits among immigrant women under the Medi-Cal expansion. Among women likely to have undocumented status, we estimate an increase of 1.5 visits during the post-period, on average. This represents an 18 percent increase over the baseline estimate of 8.5 prenatal visits. This also brings the average number of visits closer to levels of utilization observed for US-born women at the time.[38] Shown in Appendix Figures A7(b) and A8(b), there is a gradual increase in the number of prenatal visits over time, a pattern that is consistent with the observed changes in infant health following the policy change.

We also examine the presence of any pregnancy complications as reported on the birth record. Our measure of complications includes pregnancy-specific complications (placenta previa, pre-eclampsia or pregnancy induced hypertension, hemoglobinopathy, kidney infection/pyelonephritis, anemia, and transport of mother from another facility prior to delivery) and pregnancy complications related to chronic diseases (chronic hypertension, cardiac disease, diabetes, lung disease, rubella, Rh sensitization, uterine bleeding before labor, and renal disease).[39] Changes in these types of pregnancy complications might indicate either changes in the diagnosis of or the prevention of conditions that might impact health during pregnancy and infant development.

We find a significant decrease in pregnancy complications among likely undocumented women (Table 4). The event study estimates (Appendix Figure A8(c)) indicate somewhat larger improvements in pregnancy complications in the first three years of the policy, although we note that there does appear to be a slight upward trend in this outcome in the pre-policy period.

Combined, these findings suggest that access to prenatal care increased in a meaningful way after the policy change, and that this access may have translated into better health during pregnancy.

6   Discussion

We find strong evidence that expanded Medi-Cal coverage to pregnant undocumented immigrants led to improved coverage, prenatal care utilization, and better infant health. To better understand the magnitude of our reduced form estimates, we can scale the changes in utilization and health by the corresponding change in prenatal coverage. We use our estimate of a 16.8 percentage point increase in Medi-Cal prenatal coverage to conduct this scaling, but note that this may understate the effect of the policy on coverage (and thereby overstate the effect of coverage on outcomes) given that it

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[38]We estimate that the average number of prenatal visits for U.S. born mothers was 11.3 in 1989.

[39]This measure was constructed in consultation with Dr. Priya Batra, an obstetrician-gynecologist, who helped to review medical data worksheets available on the birth records and identify pregnancy complications that were consistently captured over the study period.

is measured relative to a partially-treated year. Applying this scaling implies that newly enrolled immigrant women were 7 percent more likely to use any prenatal care and increased their number of prenatal visits by roughly 4.5 visits, on average. These changes translated into higher average birthweights of 130 grams (a 4 percent increase over baseline) and 3.7-day longer gestational lengths among new enrollees, shifting births from middle to higher birthweights and from early term (37-38 weeks) to full-term (39 weeks or greater). There was also a 5 percentage point decrease in the likelihood of a birth being small-for-gestational age, which represents a 54 percent decrease compared to the baseline rate among all immigrant mothers. For all measures it is important to note, however, that baseline infant health outcomes were likely worse among undocumented immigrants who took up coverage, and therefore effects may be smaller as a percent of the relevant baseline.

Following Clarke et al. (2020) who evaluated a national prenatal intervention in Chile, we can compare these effect sizes to the estimated cost of Medi-Cal prenatal participation to infer the cost per gram of birthweight gained. Norton et al. (1996) report that the cost of Medi-Cal prenatal services was approximately $480 per pregnancy in 1991,[40] which translates into roughly $1,000 today. This indicates that the cost per gram of birthweight was just under $8. This estimate is slightly less than the $11 per gram under the Chilean prenatal program, as well as estimates derived from studies of the WIC program in the U.S. ($14-15 per gram as calculated by Clarke et al. (2020) and based on estimates from Rossin-Slater (2013); Hoynes et al. (2011)). Thus, our estimates appear to be in line with other interventions that target health at birth.

In contrast to some existing evaluations of Medicaid prenatal expansions (e.g. Currie and Gruber, 1996b; Swartz et al., 2017), we do not find a decrease in low birthweight (< 2500 grams) under this policy change. Instead, the changes in birthweight were concentrated to more of the middle of the birthweight distribution. While this difference in findings could be due to differences in the recipient populations,[41] it could also be related to our research design. Our analysis effectively compares younger siblings exposed to the policy to their older counterparts. This prevents us from estimating effects of expanded prenatal coverage for first births, who are at higher risk for low birthweight and may experience different benefits from prenatal exposure.[42] We note that the concentration of birthweight effects among higher birthweight infants is consistent with the patterns observed from changes

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[40]This estimate excludes the cost of labor and delivery.

[41]As described earlier in the text, undocumented immigrants were rarely included under the expansions studied by Currie and Gruber (1996b).

[42]During our study period, rates of low birthweight were 6.2 percent for first births and 5.8 percent for other births. For immigrant women, the difference was larger with rates of 6.0 percent for first births and 4.8 percent for other births.

in access to WIC (Rossin-Slater, 2013) and prenatal care in Chile (Clarke et al., 2020), which were also estimated using sibling comparisons. To the extent that prenatal interventions are potentially more beneficial for first births, when mothers have less experience with pregnancy and childbearing, it may be the case that we are understating the benefits of the program.

7 Conclusion

One out of every thirteen births in the United States is to an undocumented immigrant. But despite their large presence, in most states, pregnant undocumented immigrants do not qualify for Medicaid coverage of routine prenatal care during pregnancy. In this paper, we demonstrate the impact of the removal of this exclusion from publicly-funded health services on insurance coverage, the use of care during pregnancy, and the health of the resulting infants, who are themselves U.S. citizens by birthright.

To investigate this question, we take advantage of a dramatic expansion of eligibility for prenatal Medicaid coverage that occurred in California in 1988, increasing the percent of undocumented immigrant women eligible for coverage in the event of a pregnancy by 64 percentage points. This increase in eligibility dwarfs the income-based expansions of the 1980s, which increased eligibility by 30 percentage points among women of reproductive age (Currie and Gruber, 1996b). After the policy went into effect, nearly half of all births paid for by the state's Medicaid program were to undocumented immigrant mothers (Norton et al., 1996).

We use a novel dataset that links the universe of California birth records to Census and American Community Survey data, allowing us to overcome several empirical challenges in our setting. Using this newly linked data, we are able to identify family linkages for children and their families observed in the Census survey data. This enables us to take advantage of variation in exposure to the policy of children born to the same mother before and after the expansion occurred, as compared to births occurring entirely before or after the expansion was implemented. This within-mother approach is crucial in our setting, as we observe large changes in the composition and number of immigrants over our sample period. We also take advantage of variation in exposure across immigrant mothers, who were targeted by the expansion, and U.S.-born mothers, who were not, to net out secular changes in outcomes over time. Finally, we use detailed maternal characteristics from the linked survey data to identify women most likely to have undocumented status and directly benefit from the policy change. Using this empirical approach, we find that the expansion of prenatal coverage to undocumented

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immigrant mothers significantly increased use of health care by the mother in the prenatal period, and significantly improved the birth outcomes of their children. Given existing evidence on the long-run and even intergenerational impacts of early life health, our results suggest that expanding prenatal Medicaid eligibility to undocumented immigrants may have a significant impact on the health and economic outcomes of the next generation of Americans.

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**Figure 1:** Medi-Cal Eligibility by Mother's Place of Birth and Legal Status, 1984-1994
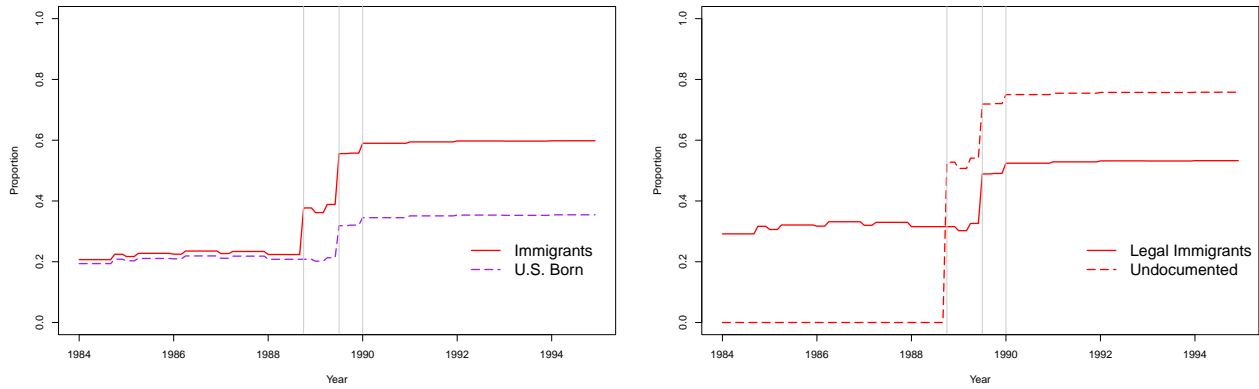
Note: Medi-Cal eligibility for women ages 15-44 in the event of pregnancy estimated using the 1990 Census. Details on eligibility and legal status imputations in Appendix Sections A and B.

Figure 2: Effects of the Undocumented Expansion on Eligibility and Prenatal Coverage
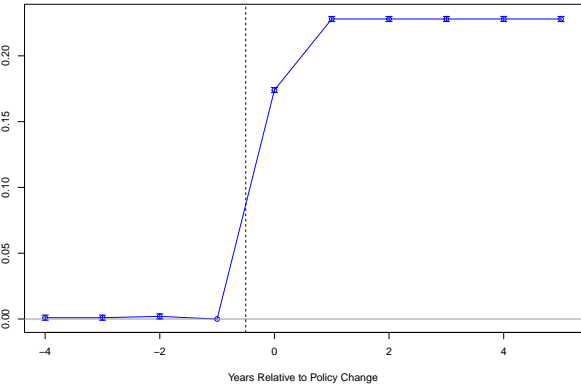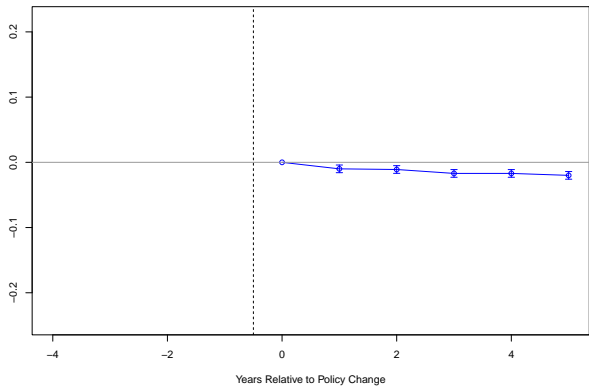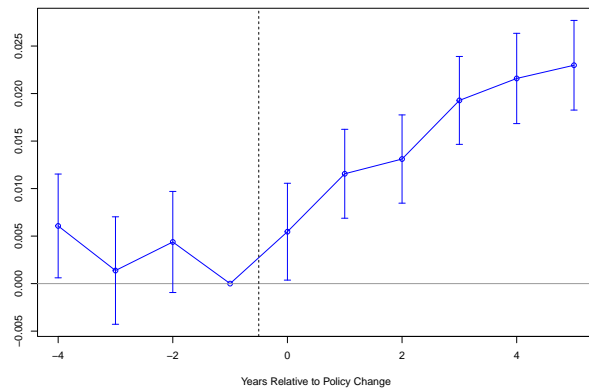
(a) Medi-Cal Eligibility
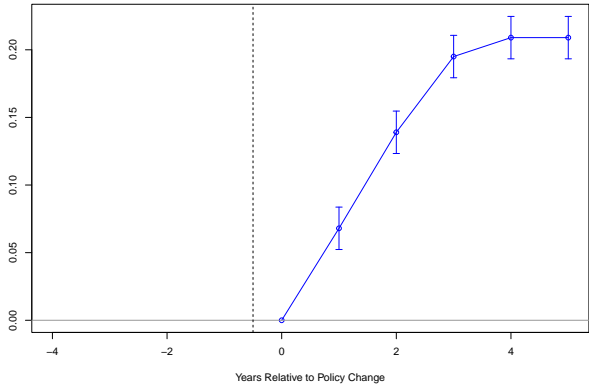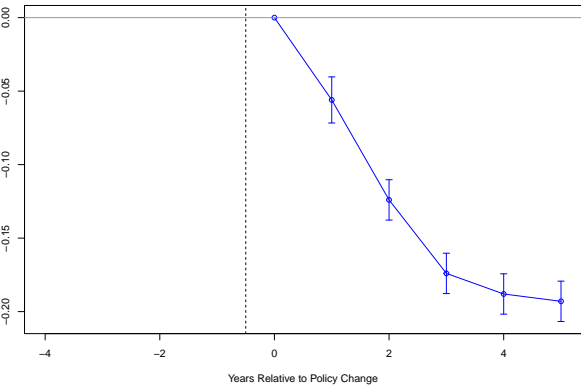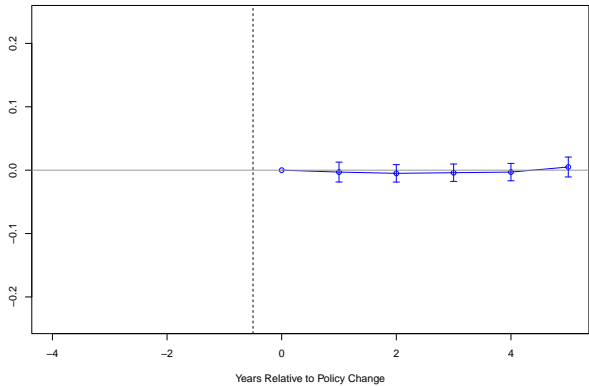
(b) Medi-Cal
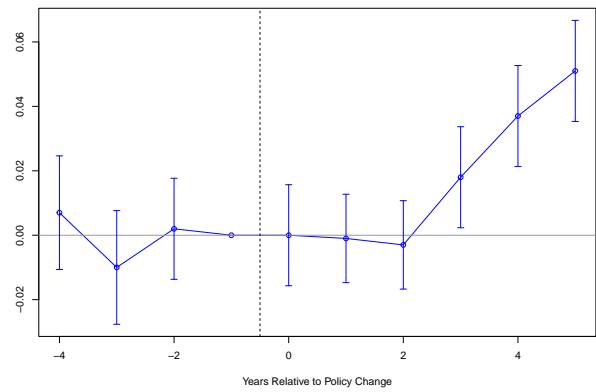
(c) No insurance

(d) Private Coverage

(e) Other Coverage

Note: Estimated coefficients and confidence intervals from the event study specification described in the text. All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY22-CES018-007. Numbers have been rounded to comply with disclosure avoidance guidelines.
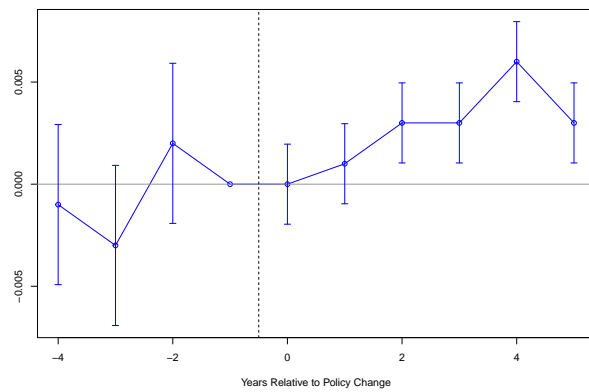
Figure 3: Effects of the Undocumented Expansion on Health Care Utilization
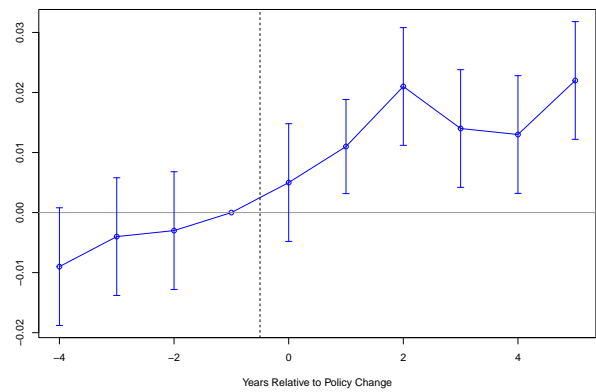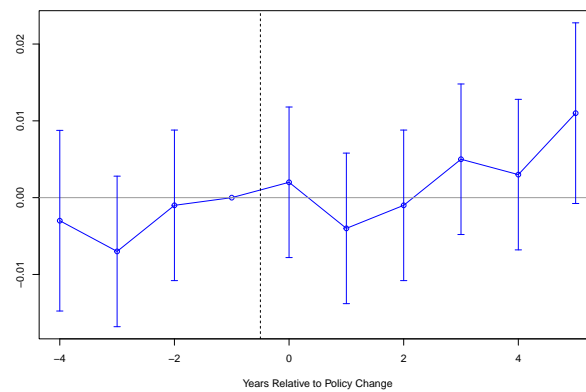

(a) Any Prenatal Care

(b) Prenatal Care in the First Trimester
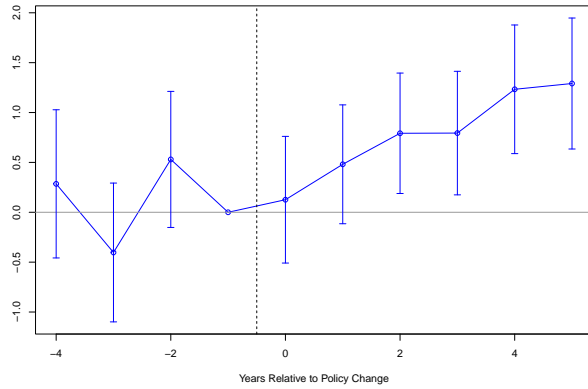
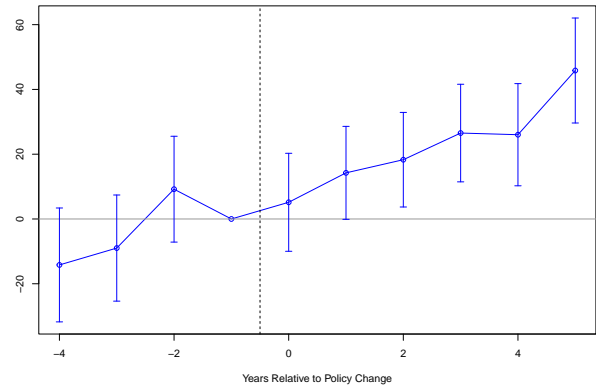(c) Hospital Delivery

(d) Doctor Delivery

(e) C-Section

Note: Estimated coefficients and confidence intervals from the event study specification described in the text. All results were approved for release by the U.S. Census Bureau, authorization numbers CBDRB-FY20-183 and CBDRB-FY22-CES018-015. Numbers have been rounded to comply with disclosure avoidance guidelines.

Figure 4: Effects of the Undocumented Expansion on Birth Outcomes

(a) Gestation Age (in Days)

(b) Birth Weight

(c) Small for Gestational Age

Note: Estimated coefficients and confidence intervals from the event study specification described in the text. All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY20-183. Numbers have been rounded to comply with disclosure avoidance guidelines.

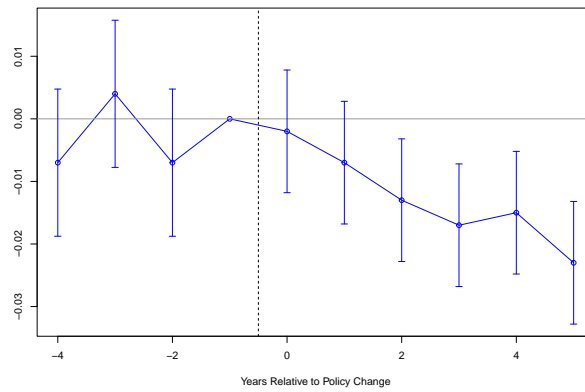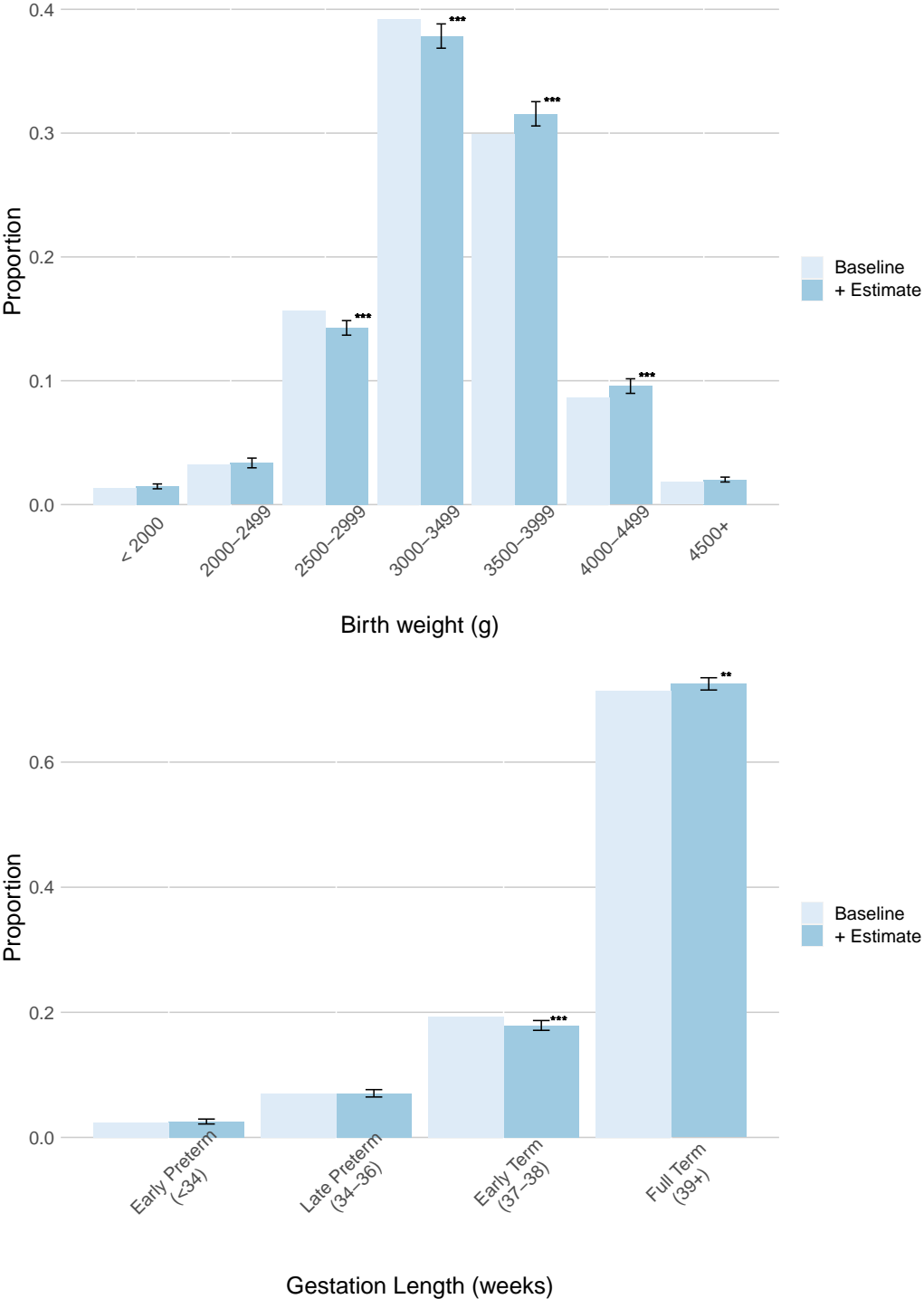**Figure 5:** Effects of the Undocumented Expansion on Distribution of Birth Outcomes

Table 1: Descriptive Statistics for Siblings Sample by Mother's Place of Birth

	All	Immigrant	U.S. Born
Singleton	0.9643	0.9719	0.9599
Female	0.4915	0.4928	0.4907
Birth number	2.212	2.425	2.089
First birth	0.3149	0.2811	0.3344
Second birth	0.3769	0.3488	0.3932
Third birth	0.1835	0.1952	0.1767
Fourth birth or higher	0.1247	0.1749	0.0957
Mother's age	27.17	26.98	27.27
Mother's race			
White	0.8511	0.7812	0.8915
Black	0.0530	0.009	0.0784
Asian	0.0857	0.2015	0.0188
Other	0.0102	0.0083	0.0112
Mother's Hispanic ethnicity	0.3694	0.6936	0.1817
Immigrant mother	0.3660	1.0000	0.0000
China	0.0060	0.0163	0.0000
Canada	0.0039	0.0107	0.0000
Cuba	0.0012	0.0034	0.0000
Japan	0.0032	0.0087	0.0000
Mexico	0.2128	0.5813	0.0000
Philippines	0.0170	0.0463	0.0000
Vietnam	0.0145	0.0397	0.0000
Rest of the world	0.1075	0.2936	0.0000
Health care utilization			
Any prenatal care use	0.9890	0.9814	0.9934
Prenatal care during first trimester	0.7887	0.6942	0.8428
Delivery in a hospital	0.9930	0.9943	0.9923
Delivery in a public hospital	0.2356	0.3169	0.1884
Delivery by a doctor	0.9326	0.9151	0.9428
C-section	0.2151	0.1865	0.2317
Birth outcomes			
Birth weight	3416	3388	3432
Gestational length	278.1	277.5	278.4
Child's age at time of survey	11.44	11.27	11.54
Mother's age at time of survey	38.61	38.25	38.82
Mother's education at time of survey			
Less than high school degree	0.2634	0.5356	0.1063
High school degree or GED	0.2026	0.1641	0.2248
Some college	0.3353	0.1853	0.4220
College or more	0.1986	0.1149	0.2469
Family type at time of survey			
Married parent family	0.6942	0.7485	0.6628
Single parent subfamily	0.3057	0.2514	0.3372
Number of observations	360,000	132,000	228,000

Notes: Analyses use 1984-1994 California birth records linked to the 2000 Census and 2001-2011 American Community Survey; see text for more specific sample information. All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY20-183. Numbers have been rounded to comply with disclosure avoidance guidelines.

Table 2: Effect of Undocumented Expansion on Medi-Cal Eligibility and Prenatal Coverage

| | Medi-Cal Eligibility | Primary Payer for Prenatal Care | | | |
| | | Medi-Cal | No Insurance | Private | Other |
	(1)	(2)	(3)	(4)	(5)
A.Effects for All Immigrant Mothers					
Undocumented expansion x immigrant mother	0.216*** (0.000)	0.168*** (0.007)	-0.151*** (0.006)	-0.002*** (0.006)	-0.015*** (0.003)
Baseline mean for immigrant mothers	0.2358	0.2695	0.2520	0.4518	0.0266
B. Effects for Likely Undocumented Immigrant Mothers					
Undocumented expansion x probability undocumented	0.637*** (0.002)	0.366*** (0.015)	-0.367*** (0.014)	0.034*** (0.012)	-0.033*** (0.006)
Baseline mean for likely undocumented mothers	0.1261	0.2933	0.3879	0.2930	0.0258
N	360,000	298,000			

Notes: Analyses use 1984-1994 California birth records linked to the 2000 Census and 2001-2011 American Community Survey; see text for more specific sample information. Coefficient and standard errors are estimated using a difference-in-differences model with birth-specific controls, birth year x birth month fixed effects, and mother fixed effects. Regression models for prenatal insurance coverage estimate changes in outcomes relative to the first year the policy was in place, due to the limited period of data available. Robust standard errors are clustered by mother; standard errors for panel B are estimated using a bootstrap procedure. Significance levels: *=10%, **=5%, ***=1%. Baseline means calculated for cohorts born before October 1988 for Medi-Cal eligibility, and for cohorts born before October 1989 for primary payer for prenatal care. Baseline means for likely undocumented mothers are calculated for births with a mother whose predicted probability of undocumented status is greater or equal to 0.5. All results were approved for release by the U.S. Census Bureau, authorization numbers CBDRB-FY22-CES018-007 and CBDRB-FY22-CES018-015. Numbers have been rounded to comply with disclosure avoidance guidelines.

Table 3: Effect of Undocumented Expansion on Mother's Health Care Utilization and Birth Outcomes

	Any prenatal care (1)	Early prenatal care (2)	Hospital delivery (3)	Doctor delivery (4)	C-section (5)	Gestation days (6)	Birthweight (grams) (7)	Small for gestational age (8)
A. Effects for All Immigrant Mothers								
Undocumented expansion x immigrant mother	0.011*** (0.001)	0.011*** (0.004)	0.003*** (0.001)	0.017*** (0.003)	0.004 (0.003)	0.620*** (0.169)	21.76*** (41.56)	-0.008*** (0.003)
Baseline mean for immigrant mothers	0.9759	0.6892	0.9930	0.9231	0.1860	279	3404	0.089
B. Effects for Likely Undocumented Immigrant Mothers								
Undocumented expansion x prob. undocumented	0.025*** (0.004)	0.039*** (0.011)	0.004** (0.002)	0.054*** (0.007)	0.006 (0.007)	1.540*** (0.394)	69.38*** (9.897)	-0.021*** (0.006)
Baseline mean for likely undocumented mothers	0.9612	0.5899	0.9941	0.8857	0.1502	278.4	3347	0.106
N	354,000	354,000	357,000	360,000	359,000	338,000	360,000	338,000

Notes: Analyses use 1984-1994 California birth records linked to the 2000 Census and 2001-2011 American Community Survey; see text for more specific sample information. Coefficient and standard errors are estimated using a difference-in-differences model with birth-specific controls, birth year x birth month fixed effects, and mother fixed effects. Robust standard errors are clustered by mother; standard errors for panel B are estimated using a bootstrap procedure. Significance levels: *=10%, **=5%, ***=1%. Baseline means are calculated for cohorts born before October 1988. Baseline means for likely undocumented mothers are calculated for births with a mother whose predicted probability of undocumented status is greater or equal to 0.5. All results were approved for release by the U.S. Census Bureau, authorization numbers CBDRB-FY20-183 and CBDRB-FY22-CES018-007. Numbers have been rounded to comply with disclosure avoidance guidelines.

Table 4: Effect of Undocumented Expansion on Fertility and Access to Care

	Birth Rate	Number of Prenatal Visits	Pregnancy Complications
	(1)	(2)	(3)
A.Effects for All Immigrant Mothers			
Undocumented expansion x immigrant mother	0.001*** (0.000)	0.747*** (0.073)	-0.003 (0.002)
Baseline mean for immigrant mothers	0.007	9.51	0.031
B. Effects for Likely Undocumented Immigrant Mothers			
Undocumented expansion x probability undocumented	0.005*** (0.000)	1.533*** (0.151)	-0.0198*** (0.005)
Baseline mean for likely undocumented mothers	0.007	8.49	0.028
N	31,850,000	163,000	360,000
N (unique individuals)	514,000	163,000	360,000

Notes: Analyses use 1984-1994 California birth records linked to the 2000 Census and 2001-2011 American Community Survey; see text for more specific sample information. Coefficient and standard errors are estimated using a difference-in-differences model with birth-specific controls, birth year x birth month fixed effects, and mother fixed effects. Regression models for prenatal visits estimate changes in outcomes relative to the first year the policy was in place, due to the limited period of data available. Robust standard errors are clustered by mother; standard errors for panel B are estimated using a bootstrap procedure. Significance levels: *=10%, **=5%, ***=1%. Baseline means calculated for cohorts born before October 1988 for birth rates and pregnancy complications, and for cohorts born before October 1989 for prenatal visits. Baseline means for likely undocumented mothers are calculated for births with a mother whose predicted probability of undocumented status is greater or equal to 0.5. All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY22-CES018-015. Numbers have been rounded to comply with disclosure avoidance guidelines.

Covering the Undocumented: The Effects of A Large-Scale Prenatal Care Intervention

Appendix

Sarah Miller   Laura R. Wherry

A   Estimating Medi-Cal Eligibility

We estimate eligibility for female California residents ages 15-44 in the event of a pregnancy using detailed information on state eligibility rules over the time period. Our eligibility calculation applies state eligibility rules for Medi-Cal under AFDC, Medically Needy, and state-specific optional eligibility groups.[43]

Note, we are unable to use the Current Population Survey for this exercise since the survey only began collecting citizenship information in 1994. We, therefore, use the 1990 Census and inflate or deflate the dollar amounts of household income and earnings to estimate eligibility in each year. The use of a fixed sample to estimate eligibility in each year produces information on eligibility changes over the period that are due to state law changes, rather than changes in state demographic or economic characteristics. This type of measure is often referred to as "simulated eligibility" and has been used as a policy instrument in a large body of work pioneered with Currie and Gruber (1996a,b) and Cutler and Gruber (1996).

Information on the state's optional Aid to Families with Dependent Children (AFDC)-related coverage groups prior to the Medi-Cal expansion were drawn from Hill (1987). Information on Ribicoff child programs was drawn from the 1983 Health Care Financing Administration (HCFA)'s *Analysis of State Medicaid Program Characteristics*, the Urban Institute's Transfer Income Model, version 3 (TRIM 3) Database, and from materials provided by Bruce Meyer and used in Meyer and Rosenbaum (2001). State Medically Needy thresholds were taken from TRIM3 and the 1984 and 1986 *Medicare and Medicaid Data Books* issued by the HCFA. Details on state changes under the Medi-Cal undocumented expansion and later income expansions were drawn from guidelines issued by the state in Martucci (1988) and Mitchell (2005).

The period of study also included some later changes in eligibility rules regarding the consideration of family assets, which we do not consider here since information on family assets is not available in the Census. Beginning on January 1, 1992, assets were disregarded for eligibility for women and infants with incomes between 185-200% FPL; assets were disregarded for all effective February 1, 1994 (Mitchell, 2005).

Also not studied here, California adopted a statewide program in 1992 to subsidize private health insurance coverage for pregnant women and infants with incomes between 200-300% FPL called the Access for Infants and Mothers Program. This was a small program with about 300 women participating each year (Zuckerman et al., 1998).

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[43]Please refer to the appendix of East et al. (2021) for a more detailed description of these eligibility rules; source information is described below.

B Identifying Undocumented Immigrants in the Census

We adapt an algorithm created by Borjas (2017) based on a methodology developed by Passel and Cohn (2014) to identify immigrant individuals with undocumented status. This methodology builds on earlier work by Warren and Passel (1987) to estimate the number of undocumented immigrants in the U.S., which is the methodology applied by the Department of Homeland Security in their annual estimates of the size of the undocumented population (see Borjas (2017) for more detailed background information). While not publicly available, the methodology was reverse engineered by Borjas (2017) based on individual Current Population Survey (CPS) data with the undocumented status identifier provided to him by Jeffrey Passel. We use the program made available by Borjas on his website in order to apply it in our context.

Under this methodology, an individual is considered to be a legal immigrant if they: are a citizen or arrived in the U.S. before 1980; receives Social Security benefits, SSI, Medicare, or military insurance; are a veteran or are currently in the armed forces; works in the government sector; receives housing assistance (public housing or rental subsidies), or are the spouse of someone who receives housing assistance; was born in Cuba; are in an occupation that requires licensing; or their spouse is a legal immigrant or citizen. The Borjas (2017) algorithm also considers an individual legal if they receive Medicaid; however, we drop this rule given that undocumented immigrants were able to benefit under the Medi-Cal expansion studied here. We substitute the rule that immigrants are of legal status if they receive cash welfare under AFDC. Individuals who do not meet any of these criteria to be determined legal are considered "undocumented."

While Borjas was working with CPS data, we apply this algorithm to the 1990 Census since the CPS only started collecting information on citizenship status in 1994. The two surveys collect nearly identical information under the variables needed to assign undocumented status. There are two exceptions: the 1990 Census does not include information on receipt of health insurance through Medicare or the military, nor the receipt of housing assistance. We, therefore, are unable to consider these criteria when determining undocumented status. However, we examine how the absence of these survey items might affect undocumented assignment by applying the algorithm with and without their inclusion in the 1994-1997 CPS files. We find that the two versions perform nearly identically.

C Identifying Siblings Using the 2000 Census and 2001-2011 ACS

Among children sampled in the 2000 Census and 2001-2011 ACS, we identify siblings as individuals of 17 years of age or younger who are residing at home with the same mother. We use the following household and subfamily relationships reported in the survey to identify mothers:

- Rule 1: If female is wife of householder and child is identified as natural-born child, step child, or adopted child of householder, we consider her to be the mother of the child.

- Rule 2: If female is the householder and child is identified as natural-born son or daughter of householder, we consider her to be the mother of the child.

- Rule 3: If the child is identified as a child in a married couple subfamily or a mother-child subfamily and the female is a member in the same subfamily and identified as either a hus-

band/wife subfamily with child or single parent subfamily, we consider her to be the mother of the child.

Note that, unlike for children of the head of a household, information is not available that distinguishes between natural, step, or adopted child relationships between the child in a household and the wife of the household head. Therefore, under Rule 1, we will capture all mother-child relationships including those that are not biological in nature.[44] In addition, the household relationship variable used in Rule 2 to identify the natural-born child of the householder, did not have this level of detail in the 2001-2007 ACS years. In these years, the survey did not distinguish between biological and other types of children. Thus, for Rule 2 in these years, we only require that the child is the son or daughter of the householder, rather than the biological child. These data limitations will introduce some noise into the identification of mother-child relationships, but we do not expect this measurement error to differ in any systematic way across children depending on their exposure to the Medicaid expansions while *in utero*.

As additional checks on this assignment procedure, we exclude siblings to mothers who have disconcordant information on her place of birth or age across the birth certificate records. We consider her age at time of birth to be discordant if her reported age for a sibling does not fall within a 2-year window of the age expected based on her reported age and the year of birth of the prior birth observed during our study period. We also exclude siblings to mothers who have disconcordant information on her place of birth on the birth certificate record and Census/ACS report.

Because the 1989 and later birth records do have identifying information available for the mother, we are able to check the performance of this assignment procedure during the later years of our sample. We find that 96.2 percent of the birth records in our analysis sample had the same mother PIK assigned based on the birth record fields as that assigned using our ACS/Census assignment procedure.

D   Alternative First Stage Analysis Using Hospital Discharge Data

We also examine the expected principal source of payment for deliveries over the entire period using Patient Discharge Data (PDD) from the California Department of Health Care Access and Information (HCAI), formerly the Office of Statewide Health Planning and Development, linked to the birth certificate records.

The discharge records for the mother and infant for the years 1991-2012 were already linked to the corresponding state birth record by HCAI. For years prior to 1991, we performed our own linkage using information on the hospital, baby's date of birth, ZIP code of residence, mother's birthdate when available in the birth record (1989-1990) or her age in years, race and ethnicity, admission date for the delivery, whether the method of delivery was a cesarean section, and the payer for the delivery when available (1989-1990). We probabilistically matched the two data sources using the DTALINK package in Stata (Kranker, 2019). The linkages were performed in blocks defined by the hospital of birth, patient's ZIP code of residence, and mother's age in years, as well as mother's date of birth and payer information when available. We dropped multiple births and births that occurred in military

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[44]Note, in the handful of cases where both the household head and spouse are female, we consider the household head to be the mother.

hospitals and birthing centers prior to the linkage; the latter category is not included in the hospital discharge data. We also excluded birth records with missing zipcode of residence information. Finally, we only had access to hospital records for women ages 15-44, so any births to women outside of this age range are not included in the linked data.

An examination of the raw linked data (see Appendix Figure A9), prior to subsetting to our sibling sample, reveals some evidence of changes in Medi-Cal delivery coverage for immigrant women predating the undocumented immigrant expansion in October 1999. We suspect that these may be related, in part, to the passage of EMTALA in 1986. As may be seen in panel (a), there are some slight increases in Medi-Cal funded deliveries for immigrant women starting in 1986, and again in 1988. However, it remains the case that in October 1988, the date of the prenatal xpansion for undocumented immigrants, there is a jump in Medi-Cal funded deliveries that grows rapidly over the next four years before hitting a stable level around the start of 1993. By this point, over 60 percent of deliveries to immigrant women in the state are paid for by Medicaid. In contrast, the rates of Medi-Cal funded delivery services for U.S.-born women are more steady over the period, although experience some slight growth over the early 1990s (around 6-7 percentage points), following the income eligibility rule changes. These pre-policy delivery coverage changes translate into differential pre-trends in the event study analysis (see Appendix Figure A10).

Given the policy targeted prenatal care (rather than coverage for labor and delivery), we focus on estimated changes in prenatal insurance coverage to characterize the policy's effects on in the main text. Not only do there appear to be a number of changes in delivery payer prior to the policy change, but it also appears to be the case that a larger share of undocumented immigrants were uninsured for prenatal vs. delivery care (as may be seen in Appendix Figure A9(b) in 1989). The plots here suggest that Medi-Cal and other sources of coverage may have been easier to access for delivery care prior to this policy change.

E Predicting Undocumented Status in the Linked Natality Data

In our analyses, we estimate the likely undocumented status of mothers in our sample around the time of the policy change. While the data are unavailable to do this for 1988, we can use 1990 Census data. To do this, we construct a sample of immigrant women in the state with children under 6 years of age. We then run a prediction model for undocumented status, as identifed using the Borjas methodology, where the predictors are fixed maternal characteristics that are also observed in the 2000-2011 Census/ACS data linked to the birth records. We need the maternal characteristics to be fixed since mothers are observed around 11 years later in the 2000-2011 Census/ACS data and time-varying characteristics may have changed noticeably during this period. We use the mother's age, her country of birth, her year of entry in the U.S., and her county of residence as the predictors. We estimate a probit model and then use the estimated coefficients from this model to predict her likely undocumented status in 1990 based on the characteristics we observe in the birth records linked to 2000-2013 Census/ACS data. We use information on the mother's county of residence and age in 1990 from the birth record and information on her year of entry into the U.S. and detailed country of birth from the Census/ACS data. When implementing this prediction, we assume that women who entered the U.S. after 1990 have the same likelihood of undocumented status as those who entered in 1990.

Figure A1: Number of Immigrant Women of Reproductive Age in California by Year of Entry to the U.S., Place of Birth, and Educational Attainment
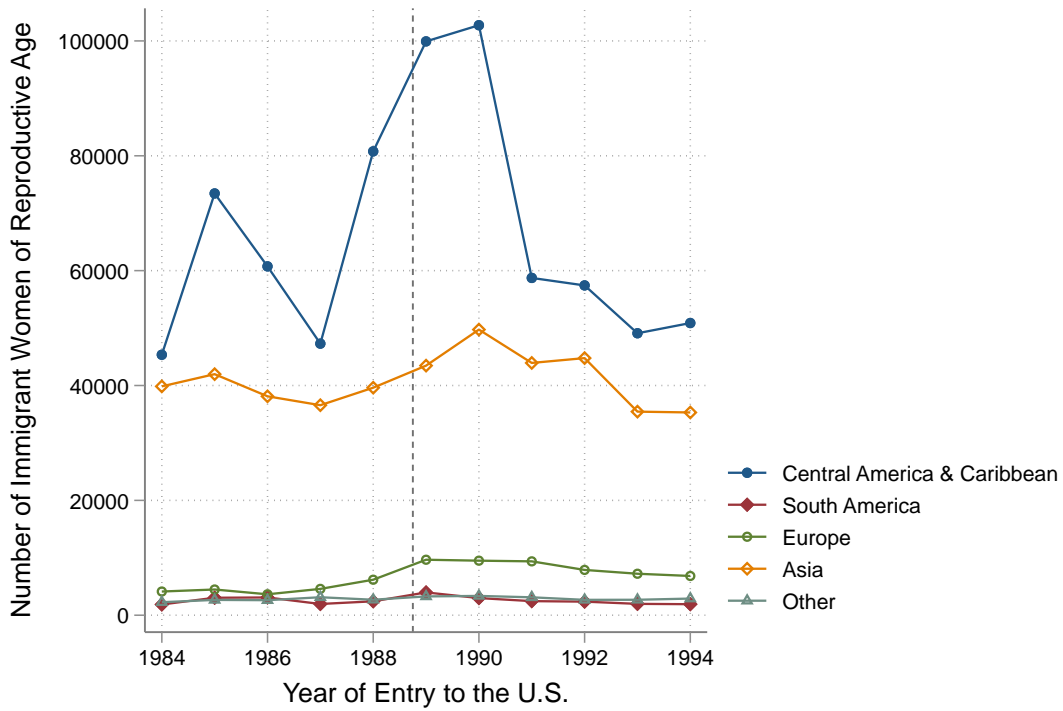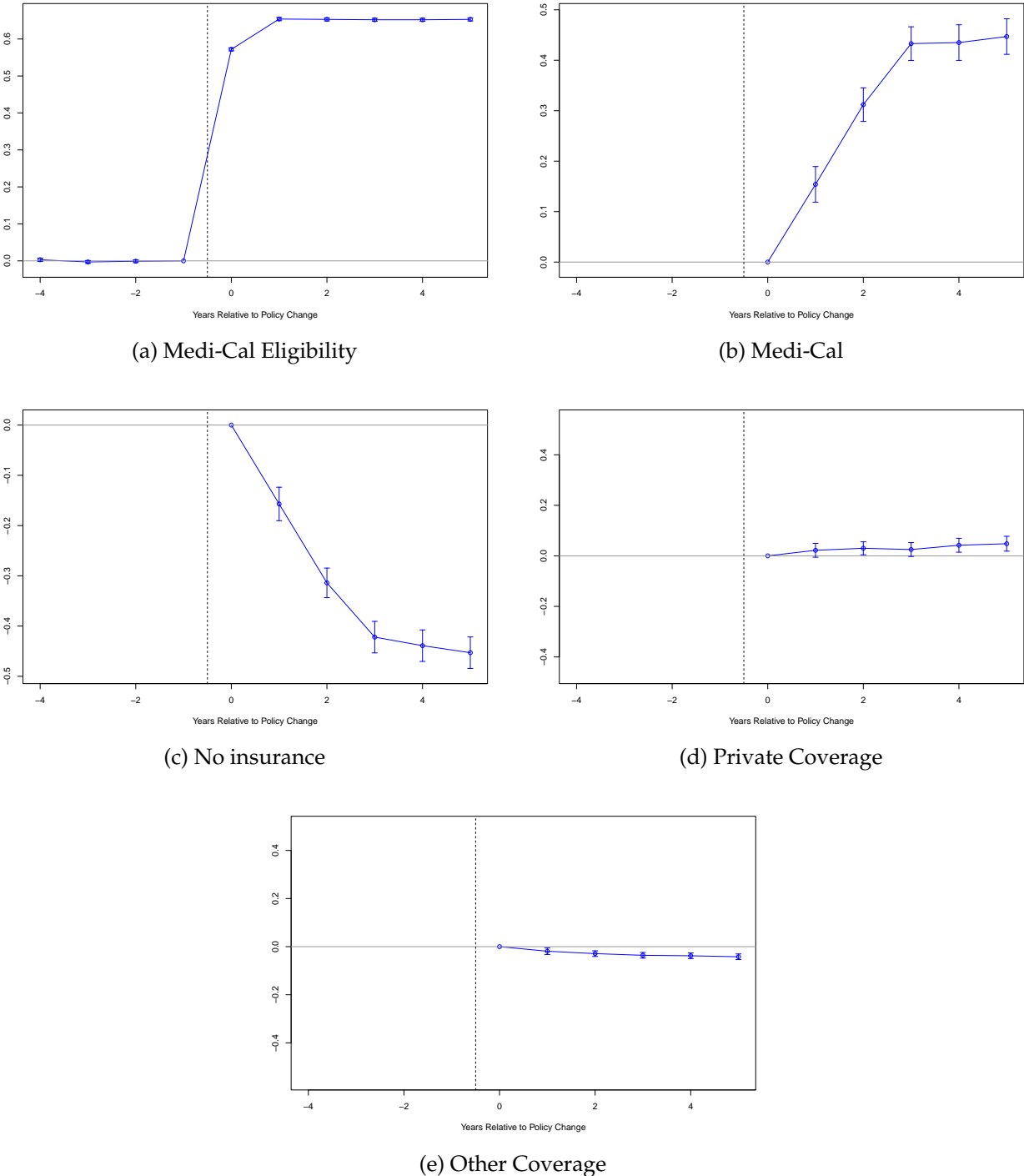

(a) By Place of Birth
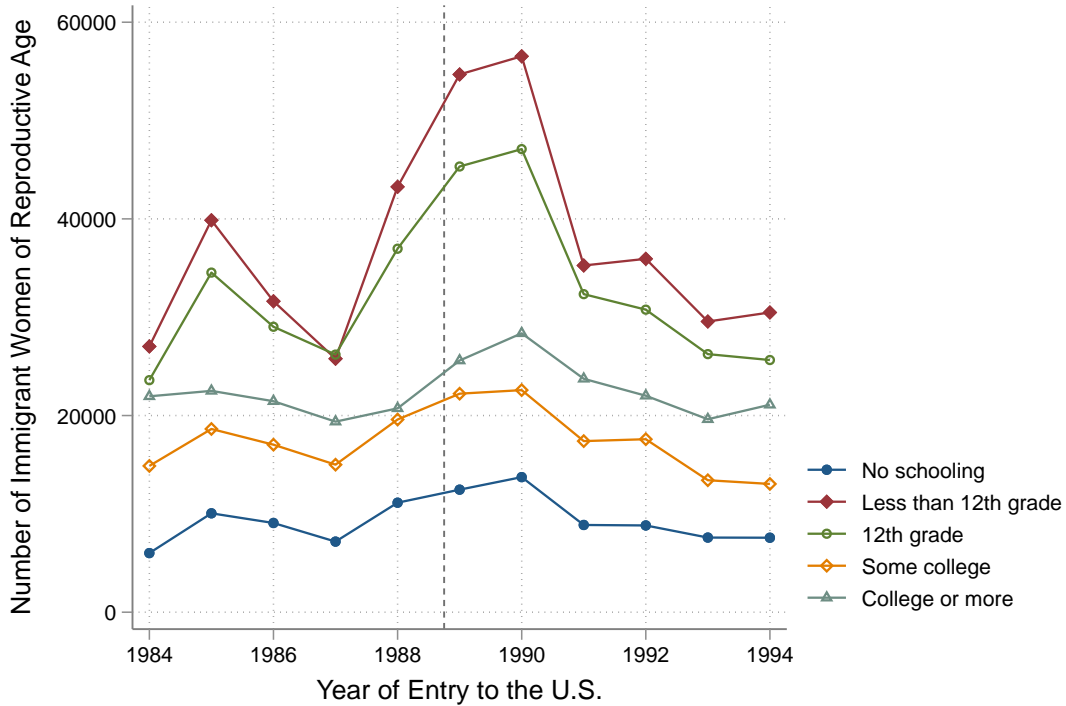

(b) By Educational Attainment

Notes: Numbers of immigrant women of reproductive age during 1984-1994 in California by year of entry to the U.S. are estimated using the 2000 Census. Information on place of birth and educational attainment are from the 2000 survey.

Figure A2: Effects on Prenatal Coverage for Likely Undocumented Immigrant Mothers

(a) Medi-Cal Eligibility

(b) Medi-Cal

(c) No insurance
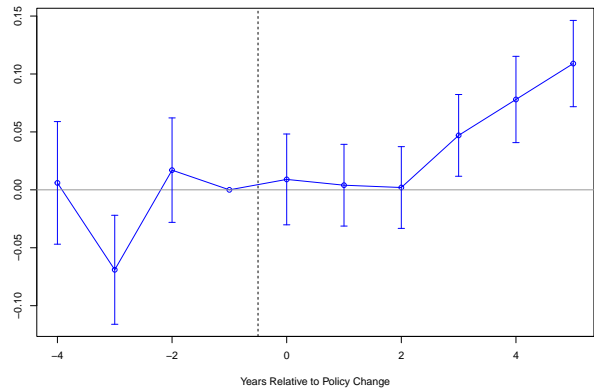
(d) Private Coverage

(e) Other Coverage

Note: Estimated coefficients and confidence intervals from the event study specification described in the text. All results were approved for release by the U.S. Census Bureau, authorization numbers CBDRB-FY22-CES018-007 and CBDRB-FY22-CES018-015. Numbers have been rounded to comply with disclosure avoidance guidelines.
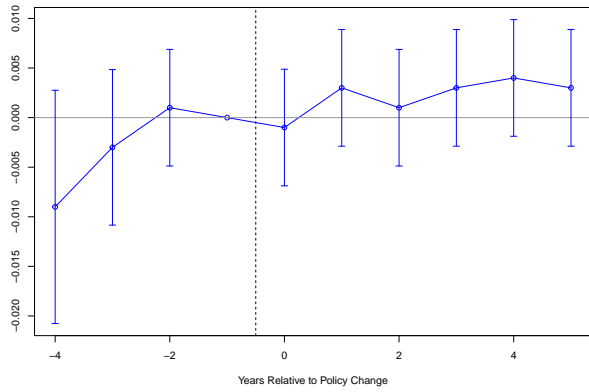
Figure A3: Effects on Health Care Utilization for Likely Undocumented Immigrant Mothers
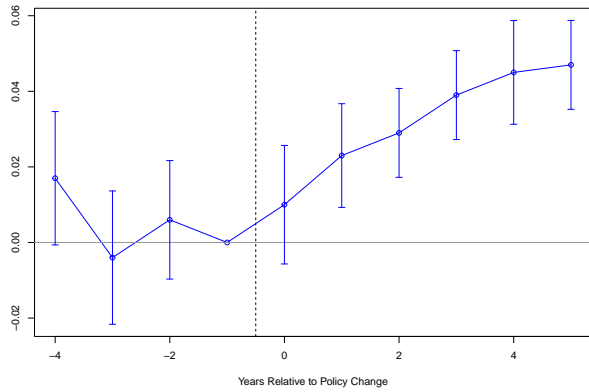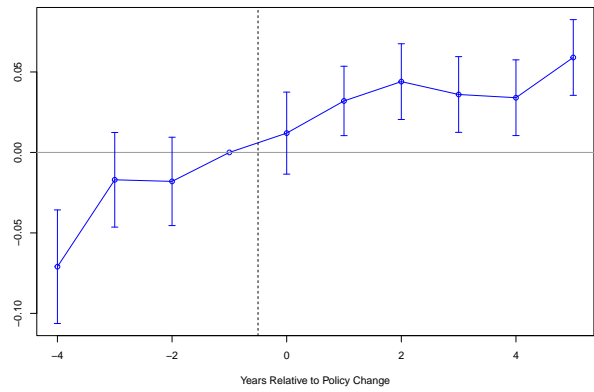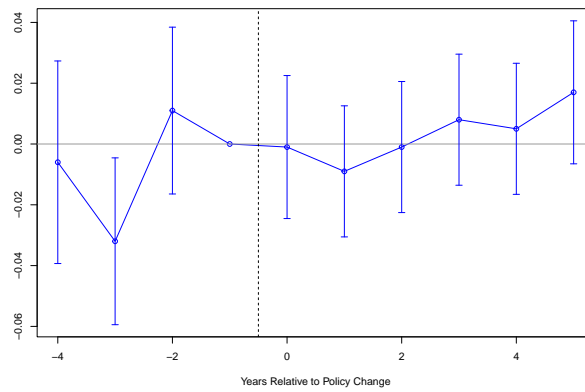

(a) Any Prenatal Care

(b) Prenatal Care in the First Trimester
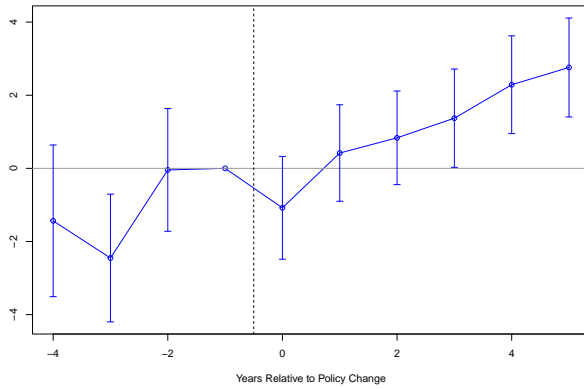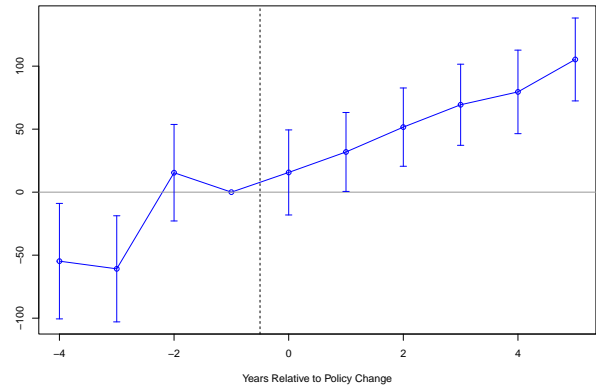
(c) Hospital Delivery

(d) Doctor Delivery

(e) C-Section

Note: Estimated coefficients and confidence intervals from the event study specification described in the text. All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY22-CES018-007. Numbers have been rounded to comply with disclosure avoidance guidelines.

Figure A4: Effects on Birth Outcomes for Likely Undocumented Immigrant Mothers

(a) Gestation Age (in Days)
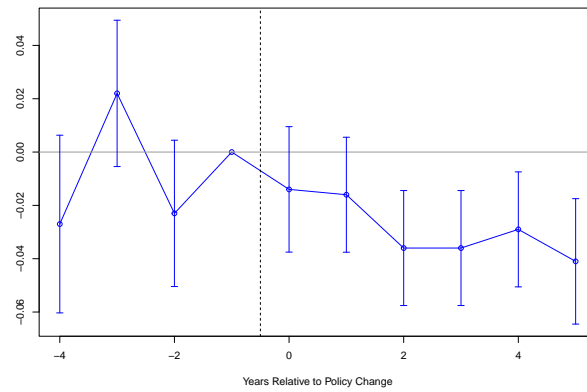
(b) Birth Weight

(c) Small for Gestational Age

Note: Estimated coefficients and confidence intervals from the event study specification described in the text. All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY22-CES018-007. Numbers have been rounded to comply with disclosure avoidance guidelines.

Figure A5: Distributional Effects for Likely Undocumented Immigrant Mothers
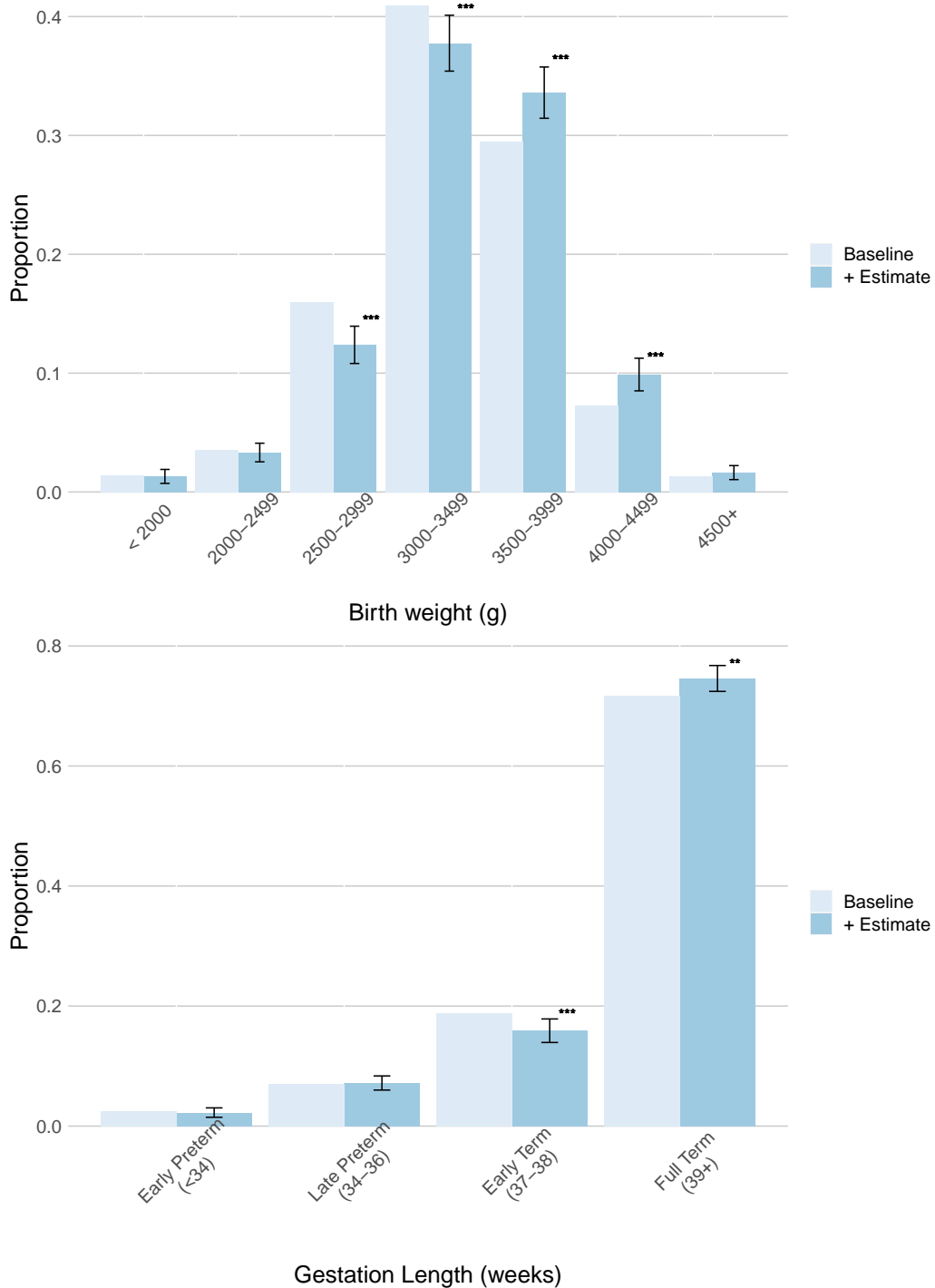
Note: Estimates for the post-period calculated by using the baseline mean for likely undocumented immigrant mothers and adding the difference-in-differences estimate and its confidence interval. All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY22-CES018-007. Numbers have been rounded to comply with disclosure avoidance guidelines.

Figure A6: Change in Eligibility by County, June 1989 to January 1990

Notes: Change in eligibility for women of reproductive age estimated using the 1990 Census and state eligibility rules.

Figure A7: Effects of Undocumented Expansion on Mechanisms: Fertility and Maternal Health

(a) Birth Rate
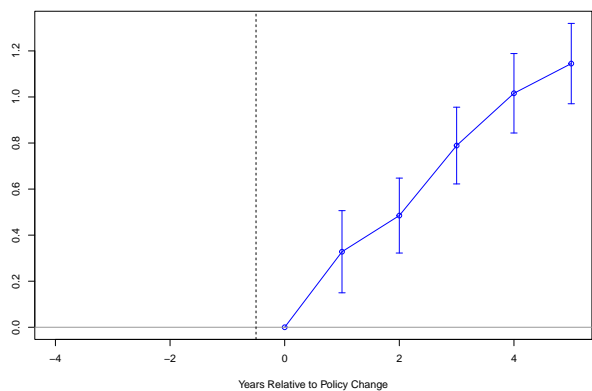
(b) Number of Prenatal Visits
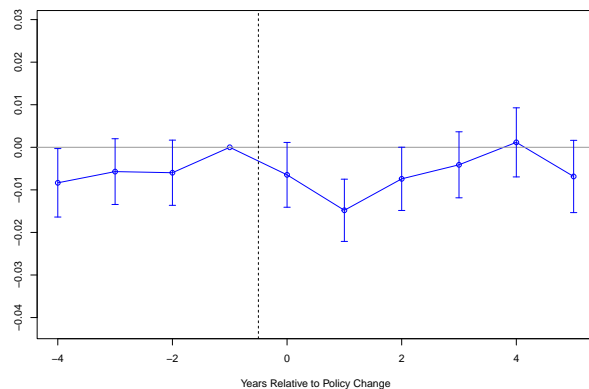
(c) Pregnancy Complications
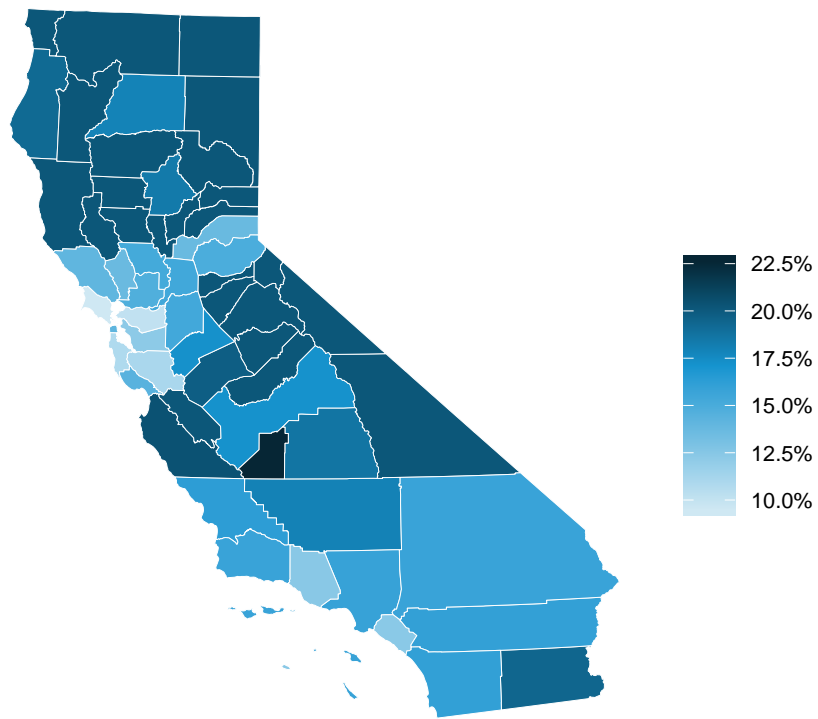
Note: Estimated coefficients and confidence intervals from the event study specification described in the text. All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY22-CES018-015. Numbers have been rounded to comply with disclosure avoidance guidelines.

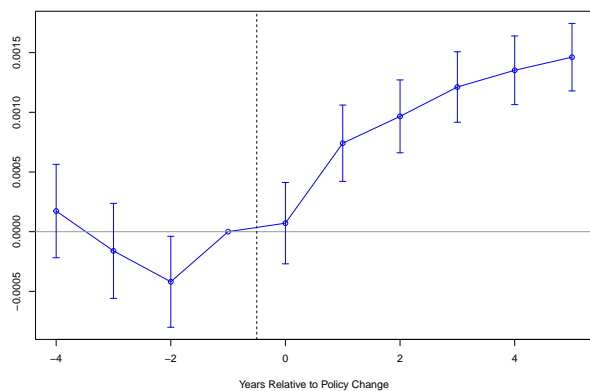**Figure A8:** Effects on Mechanisms for Likely Undocumented Immigrant Mothers
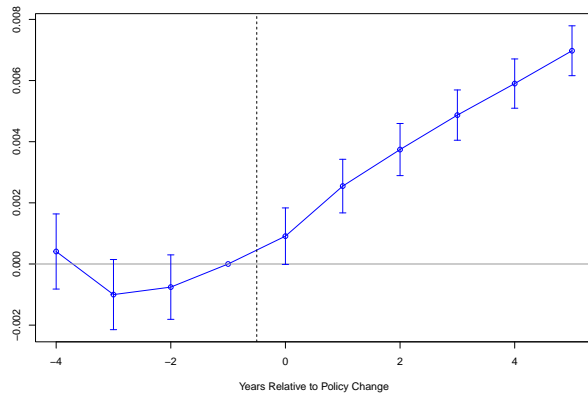
(a) Birth Rate
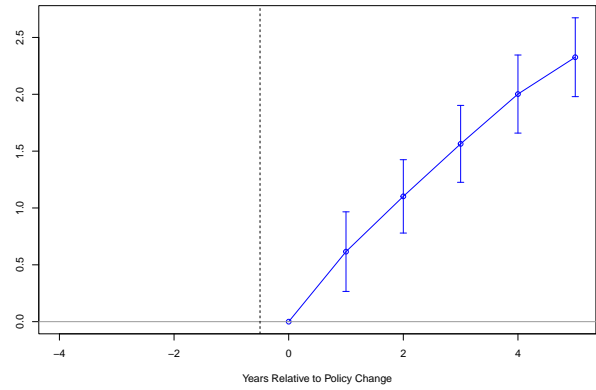
(b) Number of Prenatal Visits
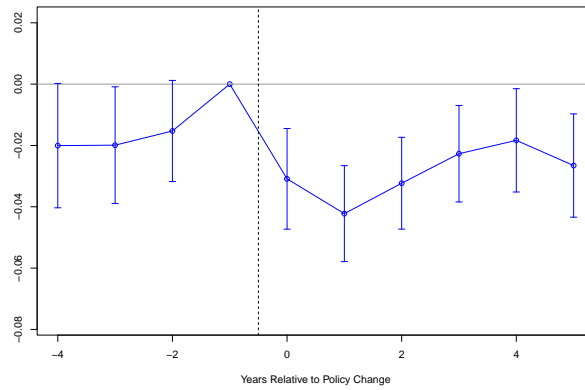
(c) Pregnancy Complications

Note: Estimated coefficients and confidence intervals from the event study specification described in the text. All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY22-CES018-015. Numbers have been rounded to comply with disclosure avoidance guidelines.

Figure A9: Delivery Coverage by Mother's Place of Birth, 1984-1994

(a) Medi-Cal

(b) Uninsured

(c) Private Coverage

(d) Other Coverage
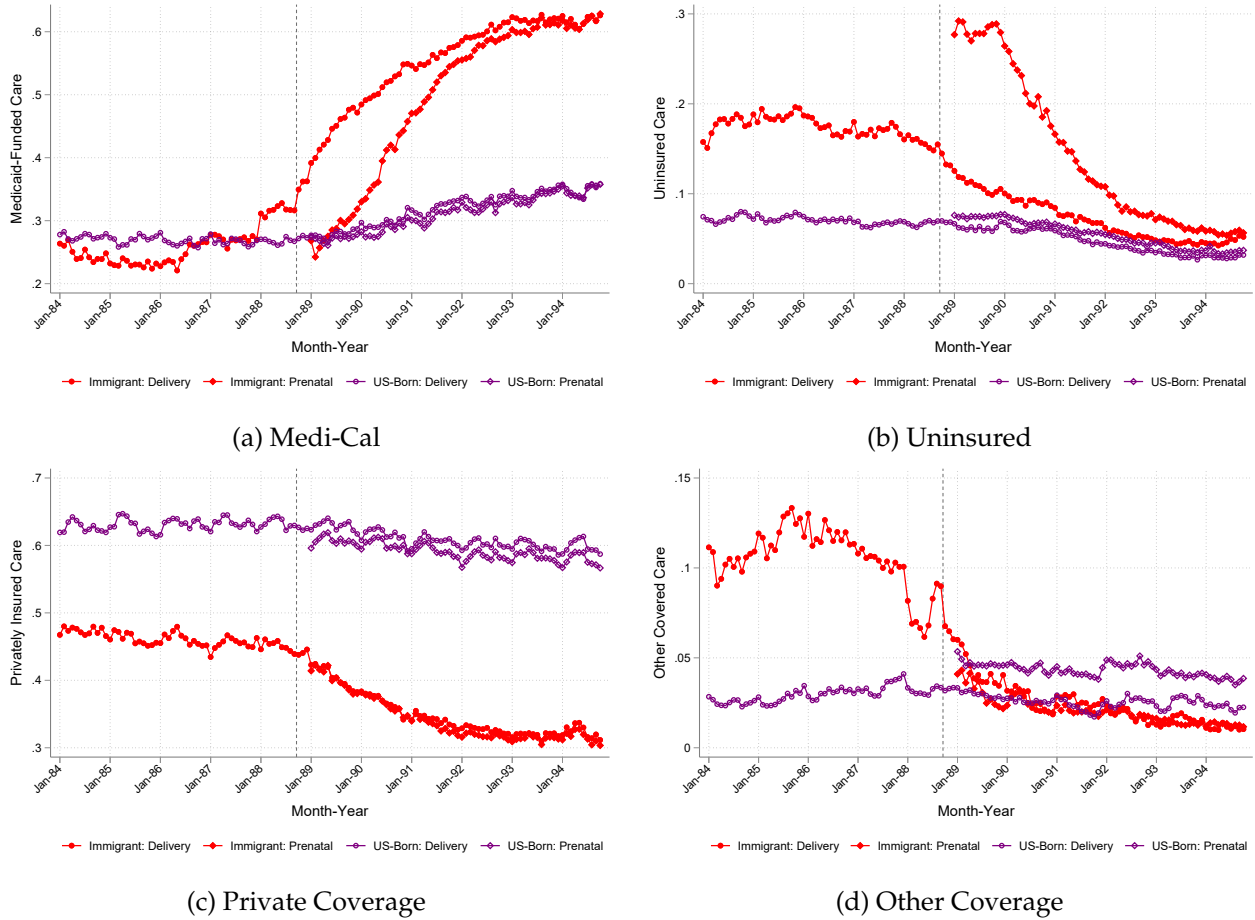
Note: Expected payer for delivery calculated using the birth records linked to California Department of Health Care Access and Information hospital discharge data. Vertical dashed line depicts the implementation of the October 1988 prenatal coverage expansion to undocumented immigrants.

Figure A10: Effects of the Undocumented Expansion on Delivery Coverage

(a) Medi-Cal
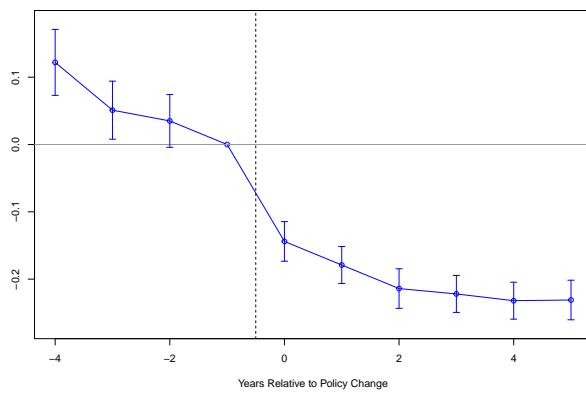
(b) No insurance
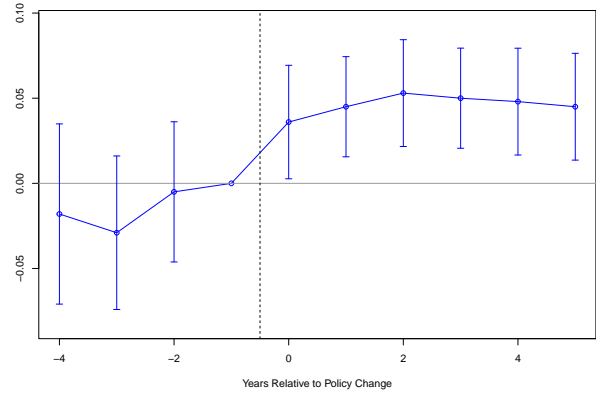
(c) Private Coverage
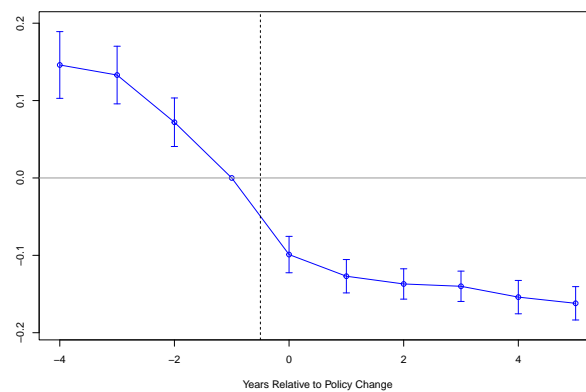
(d) Other Coverage

Note: Estimated coefficients and confidence intervals from the event study specification described in the text. All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY22-CES018-007. Numbers have been rounded to comply with disclosure avoidance guidelines.
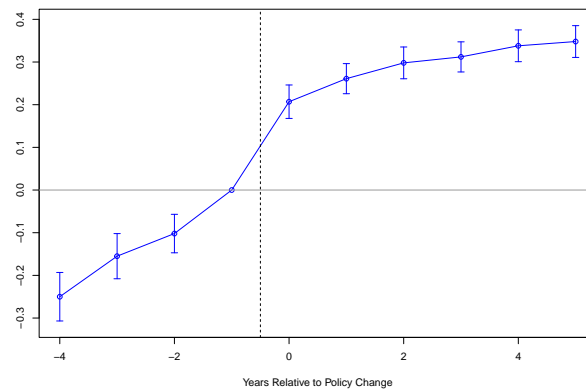
Table A1: Information on Characteristics of Births With and Without PIKs, 1984-1996

	PIK	No PIK
Singleton	0.979	0.469
Female	0.489	0.967
Birth number	2.24 (3.71)	3.63 (11.40)
First birth	0.399	0.393
Second birth	0.313	0.267
Third birth	0.165	0.167
Fourth birth or higher	0.124	0.173
Mother's age	26.82 (5.91)	26.00 (6.20)
Race		
White	0.815	0.823
Black	0.080	0.078
Asian	0.092	0.086
Other	0.013	0.013
Hispanic	0.394	0.523
Mexican	0.321	0.455
Puerto Rican	0.003	0.003
Cuban	0.002	0.001
Other	0.068	0.063
Foreign-born	0.390	0.539
China	0.009	0.006
Canada	0.003	0.002
Cuba	0.001	0.001
Japan	0.004	0.005
Mexico	0.222	0.373
Philippines	0.021	0.025
Vietnam	0.014	0.012
Rest of the world	0.116	0.114
Health care utilization		
Any prenatal care use	0.986	0.946
Prenatal care during first trimester	0.763	0.622
Delivery in a hospital	0.993	0.992
Delivery in a public hospital	0.249	0.314
Delivery by a doctor	0.931	0.920
Delivery by a midwife	0.057	0.061
C-section	0.219	0.208
Birth outcomes		
Birth weight	3380 (565.4)	3155 (809.4)
Low birth weight	0.056	0.134
Gestational length	277.7 (17.95)	269.9 (31.12)
Preterm birth	0.097	0.183
Small for gestational age	0.097	0.138
Number of obs.	6,786,000	194,000

Note: Table presents average characteristics from the birth certificate records, as well as standard deviations in parentheses for non-binary variables. All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY19-532. All numbers have been rounded to comply with disclosure avoidance guidelines.

Table A2: Characteristics of Births to Immigrant Mothers By PIK and Survey Sample Status

	Total	With PIK	With PIK and In Census/ACS Sample
Number of records meeting study criteria*	2208000	2123000	270000
Singleton	0.9822	0.9824	0.9837
Female	0.4884	0.489	0.4883
Birth number	2.308 (1.524)	2.307 (1.522)	2.274 (1.447)
First birth	0.3657	0.3655	0.3593
Second birth	0.2946	0.2954	0.3061
Third birth	0.1736	0.1736	0.1784
Fourth birth or higher	0.1661	0.1655	0.1562
Mother's age	26.93 (5.844)	26.95 (5.838)	27.44 (5.759)
Mother's race			
White	0.7705	0.7679	0.7513
Black	0.0119	0.012	0.0105
Asian	0.2069	0.2092	0.2293
Other	0.0107	0.0108	0.009
Mother's Hispanic ethnicity			
Mexican	0.5681	0.5632	0.5416
Puerto Rican	0.0009	0.0009	0.0001
Cuban	0.0032	0.0033	0.0033
Other	0.1133	0.1143	0.1125
Mother's country of birth			
China	0.0214	0.0218	0.0269
Canada	0.0088	0.0089	0.0104
Cuba	0.0034	0.0035	0.0036
Japan	0.0096	0.0096	0.0097
Mexico	0.5669	0.562	0.5403
Philippines	0.0539	0.0541	0.0592
Vietnam	0.0342	0.0347	0.0401
Rest of the world	0.3018	0.3053	0.3097
Health care utilization			
Any prenatal care use	0.9766	0.9773	0.9837
Prenatal care during first trimester	0.6763	0.6792	0.7145
Delivery in a hospital	0.9944	0.9944	0.9951
Delivery in a public hospital	0.3377	0.3366	0.3066
Delivery by a doctor	0.9168	0.9172	0.995
C-section	0.1956	0.1958	0.2024
Birth outcomes			
Birth weight	3364 (549.1)	3369 (541.3)	3380 (538.2)
Gestational length	277.2 (17.87)	277.4 (17.46)	277.5 (16.97)
Small for gestational age	0.0982	0.0940	0.0935

Note: Table presents average characteristics from the birth certificate records, as well as standard deviations in parentheses for non-binary variables. Study criteria defined as mother resided in state of California at time of birth and non-missing information on mother's county of residence, parity, birth order, sex, and mother's country of birth. All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY20-183. All numbers have been rounded to comply with disclosure avoidance guidelines.

Table A3: Descriptive Statistics for Immigrant Mothers, By Undocumented Status

	Pr(Undocumented)≥.5	Pr(Undocumented)<.5
Age at first birth in sample	23.34	26.34
Number of kids in sample	2.209	2.268
Total kids at time of last birth in sample	2.791	3.135
Race		
White	0.9357	0.6956
Black	0.0021	0.0128
Asian	0.0571	0.2823
Other	0.0051	0.0093
Hispanic ethnicity	0.9001	0.5738
Country of birth (from birth record)		
China	0.0149	0.0185
Canada		0.0167
Cuba		0.0054
Japan	0.0059	0.0106
Mexico	0.7078	0.5051
Philippines		0.0747
Vietnam		0.0625
Rest of the world	0.2713	0.3066
Other common countries of birth (from ACS/Census)		
Cambodia		0.0189
Germany		0.0143
India	0.0080	0.0125
El Salvador	0.1044	0.0266
Guatemala	0.0576	0.0090
Nicaragua	0.0151	0.0038
Korea	0.0142	0.0206
Taiwan	0.0067	0.0139
Probability undocumented	0.6503	0.1452
Year of entry into the U.S. (from ACS/Census)		
Before 1982	0.0522	0.7473
1982-1984	0.1480	0.1303
1985-1986	0.2417	0.0553
1987-1990	0.4484	0.0502
1991 or later	0.1097	0.0169
Age at time of survey	35.65	39.75
Education at time of survey		
Less than high school degree	0.6603	0.4504
High school degree or GED	0.1669	0.1656
Some college	0.1137	0.2302
College or more	0.0591	0.1538
Family type at time of survey		
Married parent family	0.7665	0.7397
Single parent subfamily	0.2350	0.2603
Number of observations	21000	38000

Notes: Analyses use 1984-1994 California birth records linked to the 2000 Census and 2001-2011 American Community Survey; see text for more specific sample information. All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY20-183. Blank entries indicate that estimates have been suppressed due to small cell sizes. All numbers have been rounded to comply with disclosure avoidance guidelines.

Table A4: Alternative Specifications: Effects on Health Care Utilization and Birth Outcomes for All Immigrant Mothers

	Any prenatal care	Early prenatal care	Hospital delivery	Doctor delivery	C-section	Gestation days	Birthweight (grams)	Small for gestational age
Main specification	0.011***	0.011***	0.003***	0.017***	0.004	0.620***	21.76***	-0.008***
	(0.001)	(0.004)	(0.001)	(0.003)	(0.003)	(0.169)	(4.156)	(0.003)
County x month-year fixed effects	0.011***	0.003	0.003***	0.017***	0.000	0.636***	24.51***	-0.008***
	(0.001)	(0.004)	(0.001)	(0.003)	(0.003)	(0.178)	(4.387)	(0.003)
County x month-year & county x immigrant fixed effects	0.011***	0.004	0.003***	0.015***	0.000	0.609***	23.84***	-0.008***
	(0.001)	(0.004)	(0.001)	(0.003)	(0.003)	(0.180)	(4.429)	(0.003)
Control for income-based expansions	0.011***	0.003	0.003**	0.015*	0.001	0.615**	22.20***	-0.006
	(0.003)	(0.008)	(0.001)	(0.008)	(0.005)	(0.285)	(4.714)	(0.004)
Weighted analysis	0.010***	0.009*	0.003***	0.025***	0.006	0.747***	25.05***	-0.007**
	(0.002)	(0.005)	(0.001)	(0.004)	(0.004)	(0.212)	(5.224)	(0.003)
	[0.9762]	[0.6569]	[0.9942]	[0.8942]	[0.1702]	[279]	[3404]	[0.089]
N	354,000	354,000	357,000	360,000	359,000	338,000	360,000	338,000
Excluding IRCA eligible immigrants	0.012***	0.026***	0.002*	0.023***	0.002	0.627***	25.43***	-0.012***
	(0.002)	(0.006)	(0.001)	(0.003)	(0.004)	(0.224)	(5.450)	(0.004)
	[0.9698]	[0.6704]	[0.9922]	[0.9206]	[0.1878]	[278.4]	[3364]	[0.1022]
N	284,000	284,000	284,000	288,000	287,000	270,000	288,000	270,000

Notes: Analyses use 1984-1994 California birth records linked to the 2000 Census and 2001-2011 American Community Survey; see text for more specific sample information. Each row reports difference-in-differences estimates for a different specification or sample, as described in the text. All regressions include birth-specific controls, birth year x birth month fixed effects, and mother fixed effects. Robust standard errors are clustered by mother or county. Significance levels: *=10%, **=5%, ***=1%. Numbers in brackets are either weighted baseline means or baseline means once IRCA eligible immigrants are excluded from the sample. All results were approved for release by the U.S. Census Bureau, authorization number CBDRB-FY20-183. Numbers have been rounded to comply with disclosure avoidance guidelines.

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Table A5: Alternative Specifications: Effects on Health Care Utilization and Birth Outcomes for Likely Undocumented Immigrant Mothers

	Any prenatal care	Early prenatal care	Hospital delivery	Doctor delivery	C-section	Gestation days	Birthweight (grams)	Small for gestational age
Main specification	0.025***	0.039***	0.004**	0.054***	0.006	1.540***	69.38***	-0.021***
	(0.004)	(0.011)	(0.002)	(0.007)	(0.007)	(0.411)	(9.802)	(0.007)
County x month-year fixed effects	0.024***	0.026**	0.003*	0.054***	0.000	1.530***	74.89***	-0.022***
	(0.004)	(0.011)	(0.002)	(0.007)	(0.007)	(0.407)	(10.38)	(0.007)
County x month-year & county x immigrant fixed effects	0.024***	0.027**	0.003*	0.051***	0.000	1.504***	73.65***	-0.020***
	(0.004)	(0.011)	(0.002)	(0.007)	(0.007)	(0.409)	(10.45)	(0.007)
Control for income-based expansions	0.024**	0.025	0.003	0.051**	0.001	1.529**	71.41***	-0.018**
	(0.010)	(0.018)	(0.003)	(0.021)	(0.018)	(0.626)	(11.53)	(0.009)
Weighted analysis	0.019***	0.031**	0.003*	0.059***	-0.002	1.880***	75.95***	-0.020**
	(0.004)	(0.014)	(0.002)	(0.010)	(0.008)	(0.490)	(11.91)	(0.008)
	[0.9661]	[0.5766]	[0.9949]	[0.8693]	[0.1442]	[278.6]	[3361]	[0.1028]
N	354,000	354,000	357,000	360,000	359,000	338,000	360,000	338,000
Excluding IRCA eligible immigrants	0.031***	0.063***	0.004*	0.064***	0.011	1.427***	77.19***	-0.027***
	(0.006)	(0.015)	(0.002)	(0.009)	(0.009)	(0.551)	(13.53)	(0.009)
	[0.9518]	[0.5584]	[0.9927]	[0.8768]	[0.1468]	[278.7]	[3339]	[0.1083]
N	284,000	284,000	285,000	288,000	287,000	270,000	288,000	270,000

Notes: Analyses use 1984-1994 California birth records linked to the 2000 Census and 2001-2011 American Community Survey; see text for more specific sample information. Each row reports difference-in-differences estimates for a different specification or sample, as described in the text. All regressions include birth-specific controls, birth year x birth month fixed effects, and mother fixed effects. Standard errors are clustered by mother or county, and estimated using a bootstrap procedure. Significance levels: *=10%, **=5%, ***=1%. Numbers in brackets are either weighted baseline means or baseline means once IRCA eligible immigrants are excluded from the sample. All results were approved for release by the U.S. Census Bureau, authorization numbers CBDRB-FY20-183, CBDRB-FY22-CES018-007, and CBDRB-FY22-CES018-015. Numbers have been rounded to comply with disclosure avoidance guidelines.

Table A6: Effects of Undocumented Expansions Estimated Using Immigrant Only Sample

A. Insurance Coverage for Prenatal Care

| | Medi-Cal | Primary Payer for Prenatal Care | | |
| | | No Insurance | Private | Other |
	(1)	(2)	(3)	(4)
Undocumented expansion x prob. undocumented	0.264*** (0.020)	-0.308*** (0.019)	0.069*** (0.017)	-0.025*** (0.008)
Baseline mean for likely undocumented mothers	0.2933	0.3879	0.0258	0.2930
N		65,500		

B. Mother's Health Care Utilization and Birth Outcomes

| | Any prenatal care | Early prenatal care | Hospital delivery | Doctor delivery | C-section | Gestation days | Birthweight (grams) | Small for gestational age |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Undocumented expansion x prob. undocumented	0.014*** (0.005)	0.038*** (0.014)	0.000 (0.002)	0.051*** (0.009)	0.003 (0.009)	0.915* (0.517)	60.18*** (12.57)	-0.012 (0.008)
Baseline mean for likely undocumented mothers	0.9612	0.5899	0.9941	0.8857	0.1502	278.4	3347	0.106
N	129,000	129,000	131,000	131,000	132,000	124,000	132,000	124,000

Notes: Analyses use 1984-1994 California birth records linked to the 2000 Census and 2001-2011 American Community Survey; see text for more specific sample information. Table reports difference-in-differences estimates for analysis limited to the sample of immigrant mothers. All regressions include birth-specific controls, birth year x birth month fixed effects, and mother fixed effects. Baseline means calculated for cohorts born before October 1988 for Medi-Cal eligibility and primary payer at delivery, and for cohorts born before October 1989 for primary payer for prenatal care. Baseline means for likely undocumented mothers are calculated for births with a mother whose predicted probability of undocumented status is greater or equal to 0.5. Standard errors are clustered by mother and estimated using a bootstrap procedure. Significance levels: *=10%, **=5%, ***=1%. All results were approved for release by the U.S. Census Bureau, authorization numbers CBDRB-FY20-183 and CBDRB-FY22-CES018-007. Numbers have been rounded to comply with disclosure avoidance guidelines.