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ABSTRACT

The Impact of Medicaid on Medical Utilization in a Vulnerable Population: Evidence from COFA Migrants*

In March 2015, the State of Hawaii stopped covering the majority of migrants from countries belonging to the Compact of Free Association (COFA) in its Medicaid program. COFA migrants were required to obtain private insurance in the exchanges established under the Affordable Care Act. Using statewide hospital discharge data, we show that Medicaid-funded hospitalizations and emergency room visits declined in this population by 31% and 19%. Utilization funded by private insurance did increase, but not enough to offset the declines in Medicaid-funded utilization. Finally, the expiration of benefits increased uninsured ER visits.

JEL Classification: I10, I14, J61

Keywords: immigration, health insurance, cost sharing, Medicaid, insurance exchange

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I. Introduction

A principal question in health economics is how insurance coverage affects the demand for health services. Those that lack financial resources are often those most in need of medical services, and, in the absence of adequate insurance, low-income populations may forgo necessary medical care. These concerns have been a driving force for the expansion of government-provided or government-subsidized health insurance in many countries around the world, including the United States. The Affordable Care Act (ACA) of 2010 established subsidies for low-income households to purchase private insurance in marketplaces and incentives for states to expand coverage in their Medicaid programs. As a consequence of the ACA, the percentage of uninsured people in the United States decreased by 41%, a reduction from 48 to 28 million between 2011 and 2015 (Cohen et al, 2017). Importantly, the ACA had the largest impacts on the poor and on minorities (Cohen et al, 2017).

At a time when the United States was expanding health insurance coverage for its poorest citizens, the State of Hawaii reduced health care coverage for a small, but vulnerable, portion of its population. Until March of 2015, the State of Hawaii enrolled eligible migrants of countries belonging to the Compact of Free Association (COFA) in a state-funded Medicaid plan. COFA migrants are from the Republic of Palau, the Republic of the Marshall Islands, and the Federated States of Micronesia (FSM), three nation-states located in the Pacific Ocean.[1] At the time, the State of Hawaii was estimated to have roughly 28,000 COFA migrants (commonly referred to as "Micronesians"). Most COFA migrants are not US citizens, but under the terms of the federal Compacts, are guaranteed certain prerogatives, such as free entry to the US and the right to work. While the Compacts allow for these rights, their allowance for access to health care, particularly Medicaid, has been a highly contested issue.

In general, Medicaid is jointly financed by federal and state governments. Federal welfare reform in 1996 suspended federal funds for COFA populations through Medicaid. Despite a lack

[1] The Compact of Free Association was signed for the Federated States of Micronesia and the Republic of the Marshall Islands in 1986 (and in 1994 for Palau). Previously, these island groups were under part of the Trust Territory of the Pacific which was administered by the U.S. after World War II. After these countries became independent from the Trust Territory, the citizens of these countries elected to continue their close relationship with the U.S. under a compact of free association (COFA). In exchange for U.S. military access to FSM's ocean territories (an area of over 1 million square miles), the United States agreed to provide governmental funding for the FSM over the course of 15 years; funding was extended beyond that initial time period and is set to expire in 2026. Additionally, FSM citizens were allowed free entry into the United States at any time and, in theory, had access to medical coverage such as Medicaid and other governmental and social services.

of federal Medicaid financing for COFA migrants, the State of Hawaii continued to provide coverage via state-funded health insurance in various forms, including a state Medicaid plan provided by the State of Hawaii Medicaid agency (called Med-QUEST). Following a court ruling in April of 2014, state Medicaid program coverage for this population was suspended.[2] As a consequence, most COFA migrants were ultimately denied access to the Medicaid program in March of 2015. However, some COFA migrants were allowed to maintain Medicaid program coverage. First, CHIPRA (Children's Health Insurance Program Reauthorization Act) continued to cover pregnant women and newborns. Second, the Aged, Blind and Disabled (ABD) program continued to be available to eligible COFA migrants as well. The majority of COFA migrants, however, needed to purchase private insurance in the health insurance exchanges established by the ACA in order to continue their medical coverage; they were not eligible for the Medicaid expansion created by the ACA (McElfish, et al. 2015). COFA migrants were required to select private insurance from the state of Hawaii's health insurance exchange -- with the state paying the premium for insurance for households with incomes less than 100% of the FPL provided that they chose a Silver-level plan and could verify income (Hawaii DHS, 2014).

In this paper, we employ statewide administrative data of all hospital discharges in Hawaii to estimate the effects of expiring Medicaid program coverage on medical utilization among COFA migrants. The data are close to a census of all hospitalizations in Hawaii over the period 2014-2015. The data also contain a unique patient identification number which enables us to track individual utilization over time. Using these data, we construct an individual-level panel that covers the 24 months from January 2014 to December 2015, which includes months before and after the expiration of Medicaid benefits. The discharge data contain an ethnicity variable. We employ data for three ethnicities: COFA migrants as the treatment group, non-Hispanic whites as the control group, and Japanese as the placebo group. To address omitted zeros for non-utilizers, we include dummy observations and frequency weights corresponding to population numbers obtained from the American Community Survey (ACS).

To investigate the impact of the expiration of Medicaid program benefits on utilization among COFA migrants, we use a difference-in-difference research design. We show that there was a sharp reduction in the number of emergency and in-patient medical care admissions charged to Hawaii Medicaid (hereafter referred to as 'Medicaid') after the expiration of program

[2] For details, see McElfish, et al. (2015).

benefits for COFA migrants relative to the non-Hispanic white and Japanese populations in Hawaii among people ages 18 to 64. In particular, Medicaid-funded ER visits and inpatient admissions declined by 31% and 19%, respectively. This sharp reduction in utilization is consistent with other studies that have investigated the impact of the expiration of Medicaid benefits such as studies on Tennessee after it discontinued Medicaid benefits (see DeLeire 2019, Tarazi 2017, Tello-Trillo 2016). At the same time, there was a substantial increase in the number of emergency room (ER) visits and inpatient admissions charged to private payers, indicating that there was a move towards private insurance among COFA migrants after Medicaid program benefits expired. However, the magnitude of this increase was smaller than the reduction in Medicaid-funded utilizations. As a result, net inpatient admissions and emergency visits declined.

After Medicaid program benefits expired, there was an increase in uninsured ER visits. In particular, uninsured ER visits offset at least 25% of the decline in Medicaid-funded ER use. This result is likely the consequence of a more onerous enrollment process for private insurance than for Medicaid, which has year-round open enrollment.

We also find that the Medicaid expiration for adults ages 18 to 64 impacted children and infants. CHIPRA eligibility did not change for children under 18 years of age during this period. We show that the utilization of children ages one to 17 declined. We interpret this as a reverse woodworking effect. Coverage expired for *some* COFA migrants but many believed that it expired for *all* migrants. We further show that inpatient utilization of infants declined dramatically after the expiration of benefits. However, Medicaid-funded ER visits by infants *increased* by a large margin. This result may be the consequence of reduction in ambulatory care for newborns after the Medicaid expiration.[3]

The expiration of Medicaid benefits may have reduced utilization of COFA migrants through two possible mechanisms: increased cost-sharing and low take-up of private insurance. Both mechanisms increase the cost of medical care. First, the expiration of benefits may have increased the per-unit cost of services since Medicaid has a well-established fee schedule with generally lower reimbursement amounts than private insurance, places restrictions on co-payments, and prohibits balance billing which is the practice of providers charging patients for what insurers do not reimburse. This increase in prices reduces the consumption of medical

[3] We cannot test this hypothesis due to a lack of outpatient data.

services.[4] Second, moving COFA migrants from a relatively simple public insurance scheme to more complicated exchanges might have resulted in lower insurance take-up rates (and hence utilization) due to an increase in the complexity of obtaining insurance coverage. Medicaid has a year-round open enrollment period. In contrast, private insurers have a six-week open enrollment period. Moreover, COFA migrants had to have first applied for Medicaid and get rejected prior to being able to apply for private insurance. The ramp-up in uninsured ER visits that we saw after the Medicaid expiration is evidence of these difficulties enrolling in private insurance

Another factor for lower insurance take-up is that education levels and literacy rates are substantially lower for COFA migrants compared to other ethnic groups. For example, Akee (2010) showed that 7.8% of adult male immigrants from the FSM have no education, 6.5% have between one and six years of education, and 16.6% have between seven and eight years of education; the average years of schooling in this population is 10 years. Baicker, et al. (2012) has also showed that take-up rates of low-cost health insurance are low among those of lower income and education levels. Despite considerable outreach by advocates during the transition from Medicaid program coverage to state-subsidized private insurance coverage, this take-up issue was widely expected.

We conclude that these results provide additional evidence on the responsiveness of the demand for health services to the cost of services. A major innovation of this paper is that we show this in a vulnerable migrant population that is substantially poorer than other populations from this literature including in the Oregon Health Insurance Experiment. The removal of access to the Medicaid program resulted in only some shifting towards private insurance. However, this shift does not fully compensate for the decline in utilizations previously financed by Medicaid. In addition, we show that uninsured ER visits have increased as a consequence of the expiration of Medicaid benefits. Overall, our results suggest that there are now COFA migrants forgoing health care services. Importantly, the decline in utilization occurred despite stated-subsidized private insurance and an automatic transition from Medicaid to private insurance for migrants enrolled in Medicaid prior to March 2015.

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[4] Much cited evidence from the RAND Health Insurance Experiment (Manning, et al. 1987; Newhouse, et al. 1993; Aron-Dine et al. 2013) and the Oregon Health Insurance Experiment (Finkelstein et al, 2012) shows that increased cost sharing results in lower utilization. There is also similar quasi-experimental evidence from Card, et al. (2008) in the United States and Shigeoka (2014) in Japan. A reduction in medical utilization as a consequence of an increase in out-of-pocket expenditures without a corresponding underlying change in health status is termed ex post moral hazard or just moral hazard in the health economics literature (Pauly 1968; Cutler and Zeckhauser 2000).

The balance of this paper is as follows. In the next section, we provide some institutional background on the history of COFA migrants in Hawaii and their ability to access health insurance. After that, we discuss the discharge data that we employed and how we used it to construct an individual level panel. We then discuss the methods that we employ. After that, we discuss our results and conclude.

II. Medicaid Eligibility for COFA Migrants in the State of Hawaii

Publicly-sponsored health care coverage for COFA migrants by the State of Hawaii has been subject to various successive federal and state policy decisions. These policy changes resulted in public confusion about the actual health programs and specific benefits for which COFA migrants would be eligible. Such policy changes thus can also serve as a barrier to insurance enrollment and to obtaining health care, further compounding the socioeconomic vulnerability and linguistic and cultural barriers facing this community. Here, we provide a brief overview of recent and relevant policies.

In the 1996 Welfare Reform Act, certain non-U.S. citizens including citizens of COFA nations were deemed ineligible for federal public assistance including Medicaid. Under this Act, immigrants to the US were made ineligible for federal Medicaid assistance unless they have completed a five-year waiting period following immigration in the U.S. However, most COFA residents are classified not as immigrants, but instead as legal migrants and specifically permanently classified as “non-qualified aliens.” Thus, under this migration status, these individuals are not qualified for federal assistance. To make up for the shortfall in the wake of the 1996 welfare reform, the State of Hawaii began to provide comprehensive health coverage for COFA residents for Medicaid beginning in 1997 using state funds only (Rilkon et al., 2010). However, given that the agreement with COFA nations is a federal not a state policy, the financial responsibility for providing these benefits has often been viewed as disproportionately burdensome to the State of Hawaii, relative to limited federal support available (typically provided through limited Department of Interior funds to different state and territorial jurisdictions affected by COFA migration) (Hawaii DHS, 2009).

After the passage of ACA in 2010, COFA residents along with other lawfully present noncitizens were eligible to purchase health insurance through state health insurance exchanges. However, Medicaid-ineligible noncitizens would not be eligible for federal subsidies for premium-free assistance. Instead, the ACA required Medicaid-ineligible noncitizens with incomes less than 100% of the federal poverty line (FPL) to pay the same premium for insurance purchased on the exchange as a citizen who has income of 100% FPL (Hawaii DHS, 2014).

In the same year, due to budgetary shortfalls the State of Hawaii elected to cancel the Medicaid program eligibility for non-pregnant adult COFA residents. Instead, the State created a limited medical assistance program called Basic Health Hawaii (BHH). Several court cases contesting this change in policy were filed. Following a lawsuit, a federal court issued an injunction “requiring the state to provide Medicaid-like benefits to all non-pregnant adult COFA residents who would otherwise be eligible for Medicaid but for their citizenship status.” The State appealed this injunction to the Ninth Circuit Court of Appeals, which ruled in favor of the State of Hawaii in April 2014. The injunction remained in place until November 2014 when the Supreme Court declined to hear the case, thus ending the plaintiffs’ appeal of the Ninth Circuit decision.

Subsequently, the State created a policy in which non-pregnant adult COFA migrants who were not ABD became ineligible for Medicaid program benefits beginning in March of 2015 (Hawaii DHS, 2014; McElfish et al, 2015). Medicaid program coverage effectively ended for COFA migrants in the State of Hawaii except for children, pregnant women, and people who were ADB. Infants and pregnant women remained eligible for Medicaid from CHIPRA and those who were ABD were able to receive the same level of benefits as those available under Medicaid.

The non-pregnant, non-ABD COFA adults were instructed to buy private health insurance on the Hawaii Health Connector, the state’s health insurance exchange with premiums to be subsidized. On the exchange, COFA migrants could choose from either of two private insurers (Kaiser Permanente or Hawaii Medical Service Association (HMSA)), with the state paying the premium for insurance purchased for those with incomes less than 100% of the FPL provided that they chose a Silver-level plan and could verify household income (Hawaii DHS, 2014). The premium assistance program, however, did not pay for any deductible, co-payment, co-insurance, or other cost-sharing arrangements, in contrast to Hawaii Medicaid coverage. However, Kaiser waived these costs for those meeting eligibility requirements by demonstrating financial need.

The final policy shift to insurance exchange plans was a source of much confusion in the community. While outreach volunteers and workers held information sessions and went door-to-door to share relevant information, enrollment on the exchange itself was confusing. Compounding these challenges were the technical challenges troubling the Hawaii Health Connector website. In 2015, only a few months after the enrollment period for the COFA migrants to change to the private insurance, the Connector was closed down and to be replaced by the federally-managed exchange. This meant that anyone who had been enrolled in the connector had to re-enroll using Healthcare.gov, causing further confusion and additional outreach to the COFA community (Princeton, 2017). Unlike the Hawaii Health Connector, Healthcare.gov is not available in COFA languages, adding more challenges (Princeton, 2017). In the year 2015 only, the State's Medicaid program did institute auto-enrollment so those being dropped and those who had not chosen a plan were automatically placed into one of the two private insurance plans, with an intended 50/50 split. A recent policy analysis estimated that 3,600 COFA Hawaii residents enrolled in coverage in Kaiser in 2015 and 5,500 in HMSA (Princeton, 2017).

III. Data Description

The data used in this study are provided by the Hawaii Health Information Corporation (HHIC), a private, not-for-profit organization that was based in Honolulu, Hawaii. HHIC collected data from hospitals in Hawaii. Its catchment area included all hospitals in the State of Hawaii.[5]

We utilized raw data from HHIC that consisted of all utilizations of inpatient and emergency medical services over the period January 1, 2014 to December 31, 2015 for all individuals with Japanese, Caucasian, or Micronesian ethnicities. In total, we used data on 409,556 specific utilizations. For our analysis, we only use utilizations for Hawaii residents (i.e. people with addresses in the State of Hawaii). These data include information on the type of discharge (i.e. inpatient or ER), admission and discharge dates, ethnicity (e.g. Micronesian, Japanese, or Caucasian), gender, age, payer type (e.g. Medicaid, private insurance), total billed/charged, and

[5] The HHIC data for Tripler Army Medical Center do not include race information so we do not use hospitalizations and ER visits for this hospital. Accordingly, the data were thus nearly a census.

principal diagnosis and procedural codes. A critical feature of these data is that they include a unique patient identification number which allows us to identify the same patient over time in the raw data. This allows us to construct a panel in which we track utilization of a given individual for each month between January 2014 and December 2015. If no admissions are reported in a given month in the raw data, this indicates that no utilization likely took place in that month given the large catchment area of the HHIC data.

One important feature of the raw HHIC data is that they contain exact birthdates and death dates (for those who died during 2014-15 and provided that they died in a hospital). For people who were born during 2014-15, the panel begins on the month and year of their birth. For people who we know to have died during 2014-15, the panel ends on the month and year of their death.

Descriptive statistics from the raw discharge data are reported in Table 1a. The bulk of the sample is Caucasian comprising 65.6% of all utilizations, followed by Japanese (28.2%) and Micronesians (6.3%). This sample has slightly more women (51.2%) than men (48.8%). Finally, most of the utilizations in our sample were for people on private plans (32.4%), Medicare (28.3%), and then Med-QUEST (28.0%). Roughly 4% of the utilizations in the raw data were billed to the patient (as opposed to an insurer).

To put the data in a format suitable for regression analysis, we created an individual-level panel in which we tracked utilization for all months between January 2014 and December 2015. To do this, we computed the total number of admissions and charges in a given month for a given individual. We used the discharge date from the raw data to date the utilization. If no utilization took place for an individual in a month, we entered a zero for the cost and utilization variables. Next, we dropped all individual/month observations for which total charge exceeded one million dollars. This resulted in a final panel data set containing 205,691 individuals and 4,782,091 month/individual observations.

The HHIC data and the resulting panel described herein only include individuals with at least one admission to a hospital or an ER during 2014-15. The sample excludes people who had no such contact with the medical system during this time (i.e. people who had no inpatient admission or emergency room visit during this time period). Importantly, if we did observe data for these individuals, the dependent variables (most likely) would have been a 24-month period string of zeros given HHIC's almost universal catchment area.

Table 1b presents population counts from the American Community Survey (ACS). The five-year counts from the ACS from 2011-2015 correspond to people who report Micronesian (excluding Guamanian/Chamorro), Japanese, or White as one of their ethnicities. Our estimates of ACA-based population of Micronesians, Japanese, and Whites are, respectively, 27,890, 310,595, and 604,474, whereas corresponding counts in the HHIC data are 11,530, 63,160, and 131,327 indicating that there are many missing zeros from our panel indicating that they did not use any acute care services.[6]

The solution to this is fairly simple. For each of the three ethnicities considered and for each age/gender category, we added a single dummy observation in which all of the outcome variables were coded as zeros. We then created a set of frequency weights as follows. All individuals in the initial HHIC panel received a weight of unity since they represent exactly one population unit. For each of the dummy observations, which correspond to the omitted zeros from the HHIC data, we set the weight equal to the difference between the population counts for the ethnicity/age/gender category from the ACS and the corresponding ethnicity/age/gender category from the HHIC data. This procedure ensures that the denominators in our means correspond to the population counts as opposed to those who were merely present in the HHIC data (see Appendix A for additional details).[7] Summary statistics on utilization and charges from the panel are reported in Tables 1c and 1d. All statistics use the frequency weights and address the issue of omitted zeros. Table 1c reports statistics for all individuals and Table 1d reports statistics for COFA migrants for the period prior to March 1, 2015. In each of these tables, descriptive statistics are reported for individuals of all ages in the top panel, people under 65 years in the middle panel, and people 65 and over in the bottom panel. Utilization and charges are broken down by inpatient admissions and ER visits. We also report statistics for all utilization under the heading "all payers," utilization charged to Medicaid, utilization charged to private insurance, and utilization not charged to any payer, "uninsured."

[6] There is a recent report from the US Census Bureau that estimates that there are 18,874 COFA migrants in the State of Hawaii (US Census Bureau 2018). This estimate only counts people who migrated to Hawaii since 1986 and does not count additional people in the ACS who report Micronesian as a race or ethnicity. This is an important distinction because the HHIC ethnicity question only asked the patient if they reported Micronesian as a race or ethnicity. Hence, we contend that the count of 27,890 is based on questions that better match the HHIC ethnicity information.

[7] Note that the counts of many groups in the US Census are not perfect. This is particularly true of marginal groups, who may be undercounted. Accordingly, we do conduct some sensitivity analysis.

In the top panel of Table 1c, we see that on average there were 0.0042 inpatient admissions and 0.0135 emergency room visits per patient-month. This translates to an inpatient admission about every 20 years and an ER admission about every 6 years for entire population. On average, total charges per patient-month for all admissions (i.e. inpatient and ER) were $176.49. The average amount charged to Medicaid was $33.52 and to private payers was $47.49. The remainder was paid by other payers such as Medicare.

Table 1d provides descriptive statistics from the COFA population for the period prior to March 2015. The table shows that COFA migrants are sicker than the overall study sample. For example, the mean of hospital admissions per patient-month among COFA migrants under 65 was 0.0075, whereas it was 0.0032 for the entire sample under age 65 in the previous table. Accordingly, the hospitalization rate for COFA migrants is more than twice that of the study sample. Similarly, the lower health status among COFA migrants is also reflected by the observation that Micronesians accounted for 6.3% of the study discharges for the three ethnicities, but 3.0% of the state's population of the corresponding ethnicities.

In Figure 1, we display bar graphs depicting total admissions per patient-month charged to Medicaid, private insurance, Medicare, and the individual by ethnic group for the entire sample period over 2014-2015. The top panel shows inpatient admissions and the bottom panel shows ER visits. The left panel shows utilizations for people under 65 years and the right panel corresponds to people 65 years and older. Several observations are apparent. First, for the duration of our sample, COFA migrants are substantially more likely to have their utilizations charged to Medicaid than either the Japanese or Caucasians. Second, we see a discontinuous jump in total charges to public insurance for people 65 years and older. However, while utilizations of the Japanese and Caucasians are charged to Medicare, COFA migrants are by-and-large covered by Medicaid when they are elderly which is consistent with the discussion in the previous section. Third, COFA migrants visit the ER at much higher rates than the other two groups. Fourth, there is a much higher rate of uninsured COFA migrants in ER usage than either the Japanese or Caucasians (see bottom row of the figure).

Finally, we can use the statistics in Table 1d for COFA migrants to estimate the total cost of providing Medicaid benefits to this population for the State. For all COFA migrants, the State was charged $234.20 per patient/month for inpatient and ER services. Table 1b indicates that there were 27,890 Micronesians in the State. Accordingly, over the course of a year, this sums to

$78,382,056 that was charged to the State for inpatient and ER services. A typical assumption on the payment-charge ratio for Medicaid is 2/3 which results in a total cost of about $52.5 million to provide inpatient and ER services to COFA migrants. Note that total expenditures by the State of Hawaii in 2014 were about $10.7 billion (Rosewicz 2018). Accordingly, the cost of providing medical services to COFA migrants for the State constituted approximately 0.5 % of the State's budget in 2014.

IV. Methods

We employ a difference-in-difference (DD) research design. We let y_{it} denote a particular outcome for individual i at period t. The unit of time, t, is measured in months and covers the 24 months between January 2014 and December 2015. The main outcomes that we consider are the number of inpatient admissions or ER visits in a month and the corresponding amount charged. We further disaggregate visits by those that were charged to Medicaid, to private insurance, or to the individual. The treatment group is the COFA population which is identified as "Micronesian" in our data. Caucasians are our control group and the Japanese are our placebo group.

Our main estimation equation is the standard panel difference-in-difference model with two-way fixed effects for individuals and periods with some small modifications. Our main outcome variable is given by y_{it} . We let JP_i denote a dummy that equals one if the individual is Japanese. Similarly, $COFA_i$ is a dummy that is equal to one if the individual is Micronesian. We let $POST_t$ denote an indicator for the period being March 2015 or later. In addition, $POST_{-1,t}$ is an indicator for one quarter prior to the expiration of Medicaid benefits (Dec 2014 to Feb 2015) and $POST_{-2,t}$ is an indicator for two quarters prior to the expiration of Medicaid benefits (Sep 2014 to Nov 2014).

The main estimation equation that we employ can then be expressed as:

$$y_{it} = \underbrace{\pi_{-2}(POST_{-2,t} * JP_i) + \pi_{-1}(POST_{-1,t} * JP_i) + \pi_0(POST_t * JP_i)}_{Placebo\ Test} + \underbrace{\tau_{-2}(POST_{-2,t} * COFA_i) + \tau_{-1}(POST_{-1,t} * COFA_i)}_{Pre-Trend\ Test} + \underbrace{\tau(POST_t * COFA_i)}_{Diff-in-Diffs} + \alpha_i + \gamma_t + g(age_{it}) + \varepsilon_{it} \quad (1)$$

The estimate of parameter, τ, is the difference-in-difference estimator which is informative of the effects of Medicaid on medical utilization among COFA migrants. We clustered all standard errors at the individual-level.

Estimation of this model also allows for two specification tests that are informative of the validity of the research design. The first is a test for differential pre-trends in the COFA population. This is an F-test of $H_0: \tau_{-2} = \tau_{-1} = 0$, which has a χ_2^2 distribution. The second is a test for parallel trends in our placebo group who are the Japanese. This is an F-test of $H_0: \pi_0 = \pi_{-2} = \pi_{-1} = 0$, which has a χ_3^2 distribution. We also report an F-test of the null that the difference-in-difference parameter is zero, which has a χ_1^2 distribution.

Because we have a very large sample size, small deviations from these null hypotheses that would not have been detectable with a sample under 10,000, for example, will now be detectable. Our sample size is quite large with close to one million individuals who we observe for up to 24 months. As Deaton (1997) points out, "Larger sample sizes are like resolving power on a telescope; features that are not visible from a distance become more and more sharply delineated as the magnification is turned up." Leamer (1978) and Schwarz (1978) propose adjusting the critical values of statistical tests for the sample size to prevent the over-rejection of null hypotheses in large samples. In particular, they propose employing $q \ln n$ as the critical value of a χ_q^2-test (see pp. 130-131 of Deaton 1997). We report the Leamer-Schwarz critical values (L-S CV) in Table 2.

V. Results

Core Results

We report our core results from estimation of equation (1) for adults ages 18-64 in Table 3. We restrict our sample to this age range for our main estimations because the Medicaid expiration did not impact children (under 18) or the elderly (65 or over). The table reports the results of 12 estimations. For each estimation, we report the difference-in-difference (DiD) estimator as well as F-tests of the nulls that the pre-trend, placebo, and DiD parameters are zero. The outcomes that we consider are inpatient admissions and ER visits reimbursed by any payer, a private payer, or Medicaid (reported in Panel A). We also consider charges for each of these six outcomes (reported in Panel B). Before we discuss the DiD estimates, we note that the specification tests in the table do not indicate any pre-trends or placebo effects.

In the panel A of Table 3, we look at the effects of the policy change on inpatient admissions and ER visits. In the first column of this panel, we see that the policy had a negative but insignificant impact on inpatient admissions charged to any payer. Note that this effect is inclusive of utilizations that were funded by Medicaid and those that were funded by private insurance. In the fourth column of the same panel, we see that the Medicaid expiration had a larger negative impact on ER visits charged to any payer. The point estimate of the DiD parameter indicates a reduction in ER visits of 0.0045 per patient/month and the F-test of the null that the DiD parameter is 37 which greatly exceeds the L-S CV of 13.

Next, looking at utilization disaggregated by type of insurer (columns 2, 3, 5 and 6), we see that utilizations charged to Medicaid declined whereas those charged to private insurance increased. However, the magnitudes of the former effects are larger than the latter effects which is what accounts for the net negative impacts found in the “Any” payer columns (columns 1 and 4). In the second and fifth columns, we see that inpatient admissions and ER visits that were charged to Medicaid declined by 0.0029 and 0.0139 per patient-month. Both estimates have F-statistics that greatly exceed their L-S CV. The reported means for these two outcomes (reported in the same table for the COFA population in the pre-period) are 0.0151 and 0.0445. Accordingly, these effects amount to 19% and 31% decreases in utilization for the COFA migrants. In contrast, inpatient admissions and ER visits charged to private insurance increased by 0.0019 and 0.0064, respectively. Compared to the means of 0.0021 and 0.0124 of inpatient admissions and ER visits, these effects represent 90% and 52% increases. This indicates that the policy worked as expected with a shift in financing away from Medicaid and towards private insurers.

The second panel of Table 3 reports the effects of the Medicaid expiration on charges for inpatient admissions (columns 1-3) and ER visits (columns 4-6). These results closely mimic the results in Panel A. We see that the Medicaid expiration reduced charges for inpatient admissions and ER visits charged to Medicaid by $106 and $33, respectively. Both estimates are highly significant. As a percentage of the mean, these estimates constitute 22% and 32% decreases in charges. Conversely, the Medicaid expiration increased charges for inpatient admissions and ER visits charged to private insurers by $66 and $16, which constitute 104% and 47% increases.

Next, in Table 4, we estimate the same models as in Table 3 but now we restrict the population to people over 65 years of age. This population was eligible for Medicaid throughout the sample period. We see no effects on this population.

In the Appendix, we report three additional sets of results. First, we estimate the same models as in Table 2 except that we employ alternative weights for COFA migrants. Our preferred weights in this paper are based on a five year count from the ACS from 2011-2015 of Micronesians in the State of Hawaii. However, given the possibility that Micronesians (like many other migrant groups) might be undercounted, we also employ the count from the ACS plus the reported margin of error of 3763. Accordingly, we also report a set of results using weights based off of a count of Micronesians that is slightly higher, 31,653. The results of this exercise are reported in Table A1. Our qualitative findings are unaffected. For the second exercise (reported in Table A2), we use the log of total admissions and charges as the dependent variable. To account for the large number of zeros in the data, we added one to all observations. Note that because of this, you cannot interpret these estimates as elasticities. We did this to ensure that our findings are not being driven by outliers. This is particularly important for the charges. The results indicate that this is not the case. Third, we examine the effects of the Medicaid expiration across genders (reported in Table A3). These results indicate that the Medicaid expiration affected women slightly more than men.

Effects on the Uninsured

We now look at how the Medicaid expiration affected uninsured utilization. We estimate our two-way fixed effects DiD model using inpatient admissions and ER visits that were not charged to any insurer (either public or private) as the dependent variable (results in Table 5).

We see impacts for COFA migrants ages 18-64, but not older than 65. Uninsured hospitalizations increased for people ages 18-64 by 0.0003 per patient/month, but this estimate has an F-statistic that is only marginally above the L-S CV of 13. Uninsured ER visits, on the other hand, increased dramatically for ages 18-64 by 0.0035 per patient/month. The F-statistic on this estimate is 83, which is far greater than the L-S CV. The magnitude of this estimate is 25%

as large as the DiD estimate of the impact of the Medicaid expiration on Medicaid-funded ER visits from Table 3. In the next section, we will show that the increase in uninsured ER use ramped up prior to the official expiration date. Accordingly, at least 25% of the decline in Medicaid-funded ER use was offset by uninsured ER use. The last two columns show no impacts on uninsured admissions among COFA migrants 65 and older.

Event Analysis

We now estimate an event study modification of equation (1):

$$y_{it} = \alpha_i + \gamma_t + COFA_i \times \tau_t + g(age_{it}) + \varepsilon_{it} \quad (2)$$

For each of these estimations, we plot the τ_t estimates for all t.[8] We normalize τ_t to be zero for February 2015, which is the month just prior to the expiration of benefits. These estimations will shed additional light on the parallel trends assumption. We estimate the model for ages 18-64. We present the results in Figure 2. The figure contains six graphs corresponding to inpatient utilization and ER visits and whether the payer Medicaid, private insurance, or the individual.

We report the results for inpatient utilization in the first row. We do not see evidence of pre-trends in any of the plots. Next, we see a sharp change in utilization funded by private insurance and Medicaid precisely in March of 2015 when Medicaid benefits expired. Finally, we do not see meaningful changes in self-funded hospitalizations in the third plot in the first row.

We report the results for ER visits in the second row. As with inpatient utilization, we do not see evidence of pre-trends when the payer was either private insurance or Medicaid. The magnitude of the decline in Medicaid-funded ER visits was substantially larger than the corresponding magnitude for the increase in ER visits funded by private insurance. Finally, we see that uninsured ER visits increased relative to the pre-period after Medicaid benefits expired. Notably, this ramp-up occurred *prior* to the date at which Medicaid benefits officially expired.

[8] Note that for this specification, we combined the Japanese and Caucasians into the control group. We did this because the previous analysis did not indicate that there were different effects on the placebo group.

It is not completely clear what the cause of this ramp-up is. This is a puzzle because COFA migrants were still eligible for Medicaid during this period. Typical practice at most emergency rooms is to enroll eligible, uninsured patients in Medicaid as this guarantees payment. This indicates a rigidity preventing this from happening.[9] For example, the hospitals may have thought either that COFA migrants where not eligible for Medicaid before March 2015 or that it was not worth enrolling COFA migrants in Medicaid for a brief time period.

Results by Age

We now investigate heterogeneity in the treatment effect by age. For this, we estimate a variant of the two way fixed effects model in which we include a complete set of age dummies as well as their interactions with the COFA dummy. The model is

$$y_{iat} = \alpha_i + \gamma_t + \alpha_a + COFA_i \times \theta_a + POST_t \times \rho_a + COFA_i \times POST_t \times \phi_a + \varepsilon_{iat} \quad (3)$$

where a denotes a five year age bin between ages one and 85. For these estimations, we exclude infants and people older than 85.[10] For each estimation, we plot the coefficient on the interaction between the DiD variable and the five-year age bin denoted by the parameter, ϕ_a. In the next subsection, we will consider infants (and children) separately. As before, the figure contains six figures corresponding to type of utilization (inpatient or ER) and payer (private insurance, Medicaid, or self). Each plot contains two vertical lines at ages 18 and 65. The Medicaid expiration should have only affected people between these ages.

We see that the expiration of benefits mainly impacted adults between ages 18 and 64. However, there is evidence that Medicaid-funded ER visits by children declined. Medicaid eligibility did not change for children and, so this decline should not have happened.

Effects on the Infants and Children

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[9] Private communication with physicians working at Queens Medical Center in Honolulu indicated that just prior to the expiration of COFA Medicaid program benefits, there was a sense that it would be difficult to enroll uninsured COFA migrants in the State's Medicaid program due to the policy uncertainty so many providers may not have put forth the typical effort to support enrollment for those otherwise uninsured.

[10] As before, we are combining Japanese and Caucasian people into a single control group for the sake of parsimony.

Finally, we explore how the expiration of benefits affected Micronesian infants and children. To do this, we estimate a variant of equation (1) for children under 18. For some specifications, we include an infant dummy and its interaction with the COFA/POST variable (as well as all of the other associated interactions). We only consider utilizations charged to Medicaid.

We report the results in Table 6. The table consists of eight columns corresponding to four outcomes: inpatient admissions, ER visits, inpatient charges, and ER charges. For each outcome, we report the estimation of equation (1) without the infant interactions in the odd columns and, in the even columns, we report the results with the infant interactions.

The results indicate that the expiration of Medicaid benefits for adults affected children. We see that there was a decline in inpatient admissions and charges (columns 1 and 5). In addition, we see that there was a much larger decline in inpatient admissions and charges for infants (columns 2 and 6). There was also a decline in ER visits and charges (columns 3 and 7). However, there was a substantial *increase* in ER visits and charges for infants (columns 4 and 8).

The contrasting effects of the expiration of benefits on the utilization of infants are important. We showed that inpatient admissions declined precipitously whereas ER visits increased by a large magnitude. While our hospital data is not ideal for pinning down the precise mechanism, we suspect that the expiration of Medicaid program benefits for many COFA migrants generally led to a decline in the use of ambulatory care for newborns.

This may have led to two consequences. The first is that the use of ER visits for neonatal care increased. The second was a decline in inpatient admissions, which may have happened since primary care physicians refer patients for surgery and other inpatient services.

Prima facie, these effects on infants are puzzling since pregnant women and legally residing children were still technically covered by Medicaid after March, 2015 (i.e. the policy change should not have affected this group). What these results suggest then is that, despite their continued eligibility, there were still many children and pregnant mothers who did not use the available state-provided Medicaid services – perhaps because they were unaware that they continued to be eligible for CHIPRA coverage.

In some sense, this can be viewed as a reverse woodworking effect. Benefits expired for a large swath of the Micronesian population in Hawaii. As previously discussed, young COFA migrants were actually still covered by the State's CHIPRA program. However, it appears as if the salience of the expiration of benefits for the majority of migrants led many eligible migrants to believe that they were not covered. To this end, Hofschneider (2019) says, "parents are sometimes confused about why they have different insurance from their children, or mistakenly think that because they aren't covered that their children aren't either." In a similar vein, but in the opposite direction, Frean, et al. (2017) found that the expansion of Medicaid under the ACA increased enrollment in Medicaid among people who were previously eligible for Medicaid benefits.

VI. Conclusions

In this paper, we investigated the effects of eliminating Medicaid program coverage for a vulnerable migrant population in the State of Hawaii. To do this, we employed a large administrative database that constitutes close to a census of all inpatient and emergency room utilizations during 2014 and 2015. Difference-in-difference models indicate that the expiration of benefits decreased Medicaid-funded inpatient and emergency room utilizations for adults ages 18 to 64 by 31% and 19%, respectively. Privately-funded utilizations increased by 90% for inpatient admissions and 52% for emergency room visits. On net, the magnitudes of the publicly-funded utilization did not make up for the decline in Medicaid-funded utilization resulting in a net decline in utilization for Micronesian adults after the expiration of Medicaid program benefits.

Some of the shortfall in Medicaid-funded utilization of the ER was made up for by utilizations of uninsured patients. We find that there was a marked increase in ER visits that were charged to the patient (as opposed to Medicaid) that began earlier than the official expiration date of Medicaid benefits. This is a puzzle. Ostensibly, COFA migrants should have been eligible for Medicaid benefits up to March of 2015. Our best guess is that COFA migrants who were enrolled in Medicaid were allowed to obtain Medicaid benefits until March of 2015. However, many COFA migrants who were uninsured before March of 2015 (and, hence, eligible for Medicaid) and who sought care in the ER were not enrolled in Medicaid.

We also saw the expiration of Medicaid benefits for Micronesian adults affected Micronesian children. COFA migrants under age 18 remained eligible for the State's CHIPRA program throughout the sample period. In addition, we saw that there was a dramatic *increase* in Medicaid-funded ER visits by Micronesian infants *after* the general Medicaid benefits expired.

Unfortunately, it is hard to pin down the precise mechanism underlying this finding, but we suspect that Micronesian parents substituted ER visits for ambulatory care for their newborns once Medicaid benefits expired. These findings suggest a failure to effectively communicate that the children of COFA migrants would continue to be eligible for Medicaid even after benefits for most other COFA migrants ended.

Many of these undesirable effects were predicted at the time of the expiration of benefits. For example, Hagiwara, et al. in the May 2015 issue of the *Journal of Health Care for the Poor and Underserved* said, “There is concern that this process, which has proven to be confusing even for native English speakers, will at best be confusing for COFA migrants and at worst cause individuals to be uninsured and possibly forgo needed health care.” These prognostications turned out to be true.

An important take-away of this study for policy makers is that moving poorer people from Medicaid programs to private insurance obtained from exchanges, even when private premiums are still supported by public funds, may result in lower utilization on net. This could happen due to four reasons. First, the relative complexity of the exchanges could result in lower take-up rates of private insurance thereby leaving many without insurance. Second, the vast majority of private insurance plans entail more out-of-pocket expenses than Medicaid which typically has little or no out-of-pocket expense. Third, communicating these changes and options is not a trivial undertaking. For vulnerable populations with limited English ability and familiarity with government agencies, this may prove to be a larger hurdle than for the native-born populations. Fourth and perhaps most importantly, private insurers have a six week open enrollment period, whereas Medicaid has a year-round open enrollment period. In addition, COFA migrants must first apply for Medicaid and get rejected before they can enroll in private insurance (Hofschneider 2019). For these reasons, we would expect a transition from Medicaid to private insurance to reduce medical demand and/or utilization.

While this study focuses on a very unique policy change affecting a relatively small population, it can provide lessons to other policy makers. In particular, we have shown the difficulties of using private insurance obtained through exchanges to provide coverage to vulnerable migrant populations with low levels of education and English proficiency. Note that these difficulties persisted despite premiums that were subsidized by public funds. Medicaid appears to provide clarity and certainty that private insurers may not have been able to provide.

On the whole, we suspect that a relatively simpler single payer public insurance scheme would be better suited for vulnerable populations. However, if policy makers are insistent on using private insurers to cover vulnerable migrant populations supported by public funds, better communications and outreach are needed. This study provides some lessons on how to proceed.

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Appendix A: Discussion of Weighting Procedure

We let $S_i \in \{0,1\}$ denote an indicator for being present in the HHIC data where unity indicates presence. First, note that we can write

$$E[y_{it}|POST_t = p, COFA_i = d, S_i = 1] = \frac{E[y_{it} \times 1(POST_t = p, COFA_i = d, S_i = 1)]}{p(POST_t = p, COFA_i = d, S_i = 1)}$$

for $p, d \in \{0,1\}$. Next, we note that

$$E[y_{it} \times 1(POST_t = p, COFA_i = d, S_i = 1)] \\ = E[y_{it} \times 1(POST_t = p, COFA_i = d)]. \quad (1a)$$

This is true because $S_i = 0$ implies that $y_{it} = 0$. Accordingly, we obtain that

$$\frac{p(POST_t = p, COFA_i = d, S_i = 1)}{p(POST_t = p, COFA_i = d)} E[y_{it}|POST_t = p, COFA_i = d, S_i = 1] \\ = E[y_{it}|POST_t = p, COFA_i = d] \quad (1b)$$

This then implies that

$$E[y_{it}|POST_t = p, COFA_i = d] = \frac{E[y_{it} \times 1(POST_t = p, COFA_i = d, S_i = 1)]}{p(POST_t = p, COFA_i = d)}.$$

This is interesting because it suggests that the expectation on the left-hand side of the above equation can be estimated as

$$\sum_{i=1}^{N} y_{it}\varphi_i$$

where $\varphi_i = \frac{f_i}{\sum_{i=1}^{N} f_i}$ and f_i is the frequency weight associated with the ith observation. Note that N corresponds to the sample size in the HHIC data with the added dummy observations discussed in Section 3. The frequencies are equal to unity if the observation in in the HHIC data. For the dummy observations, they are equal to the difference between the counts from the ACS and the HHIC sample for a given ethnicity/age/gender cell. An important feature of the weights in φ_i is that they exactly correspond to what standard statistical packages such as STATA compute when you employ frequency weights.

The frequency weights that we employ are based off of the five-year population counts from the ACS reported in Table 1b. We used these counts to construct frequencies for gender/age/period/ethnicity cells. Note that the sample of Micronesians in Hawaii in any given year of the ACS is quite small, but five year averages of the ACS can be used to arrive at a fairly reliable aggregate population count. However, as pointed out by Fernandez, et al. (2018), using the ACS to construct precise counts of specific age groups and, particularly, the very young is very difficult. This is especially true for relatively small groups such as Micronesians as there is only about 200-300 Micronesians in Hawaii total in any given ACS year. Accordingly, we used the ACS to compute the proportions of Japanese, Caucasian, and Micronesian females and males who were under and over 65 which is a relatively broad category. We then used these proportions to count the numbers of each ethnicity/gender category under and over 65 and took the difference between these counts and the counts in the HHIC data. These numbers constitute the number of omitted zeros in each gender/ethnicity category under and over age 65. The resulting number of omitted zeros was then evenly allocated to each age between zero and 85.

Table 1a: Descriptive Statistics for the Raw Data

	Counts [Percentage]
Race	
Japanese	115,456 [28.2%]
Micronesian	25,621 [6.3%]
White	268,479 [65.6%]
Gender	
Male	199,758 [48.8%]
Female	209,796 [51.2%]
Unknown	2 [0.0%]
Payer Type	
Department of Defense	19,132 [4.7%]
Medicaid/Quest	114,711 [28.0%]
Medicare	115,907 [28.3%]
Miscellaneous	9,886 [2.4%]
Private Insurance	132,601 [32.4%]
Self-pay	17,319 [4.2%]

Notes: These are tabulations from the raw discharge data that we used to construct the final panel. The raw data consisted of 409,556 utilizations.

Table 1b: Population Counts in the HHIC and ACS Data

Self-reported ethnic group	HHIC	ACS	HHIC/ACS
Micronesian*	11,530	27,890	41%
Japanese	63,160	310,595	20%
White/Caucasian	131,327	604,474	22%

Notes: We used the American Community Survey over the years 2011-2015 to compute the population numbers for a given year. The counts from the ACS account for people reporting multiple races.
*Excludes Guamanian/Chamorro.

Table 1c: Descriptive Statistics from Panel Data

	Any Payer	Medicaid	Private	Uninsured
		All		
Inpt. Admissions	0.0042	0.0009	0.0013	0.0001
	(0.0683)	(0.0309)	(0.0379)	(0.0082)
ER Visits	0.0135	0.0041	0.0045	0.0007
	(0.1384)	(0.0817)	(0.0733)	(0.0291)
Total Charges	176.49	33.52	47.49	2.89
	(4031.76)	(1801.90)	(2006.50)	(309.40)
Inpt. Charges	144.72	25.24	37.05	1.39
	(3988.75)	(1776.91)	(1985.40)	(293.75)
ER Charges	31.77	8.27	10.44	1.50
	(411.19)	(212.29)	(217.68)	(88.58)
		Under 65 years		
Inpt. Admissions	0.0032	0.0011	0.0016	0.0001
	(0.0593)	(0.0347)	(0.0415)	(0.0090)
ER Visits	0.0138	0.0053	0.0055	0.0009
	(0.1405)	(0.0924)	(0.0813)	(0.0327)
Total Charges	121.57	41.44	54.67	3.47
	(3312.89)	(1987.08)	(2124.47)	(325.93)
Inpt. Charges	91.54	30.87	42.02	1.59
	(3268.94)	(1958.57)	(2101.00)	(307.56)
ER Charges	30.03	10.58	12.66	1.88
	(394.14)	(239.41)	(238.60)	(98.55)
		65 years and older		
Inpt. Admissions	0.0076	0.0001	0.0005	0.00002
	(0.0916)	(0.0120)	(0.0227)	(0.0045)
ER Visits	(0.0126)	0.0003	0.0011	0.00009
	(0.1313)	(0.0235)	(0.0369)	(0.0107)
Total Charges	354.85	7.78	24.10	1.04
	(5775.93)	(983.43)	(1562.84)	(248.22)
Inpt. Charges	317.45	6.98	20.88	0.76
	(5730.47)	(976.22)	(1551.54)	(243.54)
ER Charges	37.41	0.80	3.22	0.28
	(462.20)	(72.20)	(127.78)	(42.18)

Notes: Reports means and standard deviations in parentheses. All statistics are on a per patient/month basis. Dummy observations and frequency weights were used to account for missing zeros.

Table 1d: Descriptive Statistics from Panel Data: COFA Migrants in Pre-Treatment Period

	Any Payer	Medicaid	Private	Uninsured
		All ages		
Inpt. Admissions	0.0078	0.0065	0.0007	0.0004
	(0.0911)	(0.0832)	(0.0263)	(0.0214)
ER Visits	0.0322	0.0238	0.0032	0.0044
	(0.1951)	(0.1685)	(0.0611)	(0.0709)
Total Charges	289.53	234.20	24.32	19.80
	(5331.60)	(5049.59)	(1217.50)	(747.49)
Inpt. Charges	226.52	190.21	17.01	10.33
	(5288.16)	(5016.88)	(1196.77)	(709.84)
ER Charges	63.00	43.99	7.31	9.47
	(513.95)	(412.45)	(184.75)	(215.07)
		Under 65 years		
Inpt. Admissions	0.0075	0.0062	0.0007	0.0005
	(0.0891)	(0.0813)	(0.0266)	(0.0216)
ER Visits	0.0327	0.0240	0.0034	0.0046
	(0.1964)	(0.1694)	(0.0621)	(0.0722)
Total Charges	263.94	210.86	24.31	19.89
	(5058.00)	(4772.63)	(1222.47)	(735.92)
Inpt. Charges	201.75	167.84	16.90	10.16
	(5014.98)	(4740.65)	(1203.42)	(696.53)
ER Charges	62.18	43.02	7.41	9.73
	(502.49)	(400.35)	(179.24)	(217.52)
		65 years and older		
Inpt. Admissions	0.0135	0.0114	0.0005	0.0004
	(0.1221)	(0.1126)	(0.0212)	(0.0188)
ER Visits	0.0238	0.0189	0.0012	0.0016
	(0.1683)	(0.1504)	(0.0400)	(0.0407)
Total Charges	748.62	652.90	24.52	18.27
	(8899.61)	(8609.29)	(1124.56)	(930.93)
Inpt. Charges	670.93	591.61	19.02	13.38
	(8846.12)	(8564.88)	(1070.62)	(916.27)
ER Charges	77.69	61.29	5.49	4.90
	(687.68)	(588.55)	(264.83)	(164.97)

Notes: Reports means and standard deviations in parentheses. All descriptive statistics correspond to the period prior to March 1, 2015. All statistics are on a per patient/month basis. Dummy observations and frequency weights were used to account for missing zeros.

Table 2: Leamer-Schwarz Critical Values

	Ages 18 – 64			< 18	65+
d.o.f	All	Males	Females	All	All
1	13.01437	11.15611	11.11086	11.82689	11.80753
2	26.02873	22.31222	22.22173	23.65378	23.61507
3	39.0431	33.46832	33.33259	35.48067	35.4226

Notes: For details, see p. 130-131 of Deaton (1997). These critical values were constructed use the 2011-2015 ACS.

Table 3: Fixed Effects DD Estimates: Ages 18 - 64

Panel A	Inpatient Admissions			ER Visits		
Payer	Any	Medicaid	Private	Any	Medicaid	Private
COFA x Post	-0.0006 (0.0003)	-0.0029 (0.0003)	0.0019 (0.0002)	-0.0045 (0.0007)	-0.0139 (0.0010)	0.0064 (0.0006)
Mean	0.0190	0.0151	0.0021	0.0724	0.0445	0.0124
Pre-Trend	0.7488 [0.4729]	0.1491 [0.8615]	1.3107 [0.2696]	1.0232 [0.3595]	4.8040 [0.0082]	1.2195 [0.2954]
Placebo	0.7096 [0.5461]	0.2744 [0.8439]	0.0969 [0.9618]	7.3874 [0.0001]	4.2779 [0.0050]	2.9936 [0.0296]
DiD	3.7588 [0.0525]	77.3539++ [0.0000]	80.2275++ [0.0000]	37.1284++ [0.0000]	178.1942++ [0.0000]	120.8315++ [0.0000]

Panel B	Inpatient Charges			ER Charges		
Payer	Any	Medicaid	Private	Any	Medicaid	Private
COFA x Post	-17.9929 (19.4605)	-105.6608 (17.3662)	65.6702 (10.6646)	-9.0688 (2.1785)	-32.7700 (2.5457)	16.2033 (1.6989)
Mean	596.1473	470.1159	63.2815	170.1833	104.0121	28.0643
Pre-Trend	0.4600 [0.6313]	1.6981 [0.1830]	0.8603 [0.4230]	0.2732 [0.7609]	4.5517 [0.0106]	0.2642 [0.7679]
Placebo	1.2044 [0.3064]	0.0684 [0.9767]	1.6228 [0.1817]	4.8170 [0.0024]	5.4879 [0.0009]	0.6982 [0.5530]
DiD	0.8549 [0.3552]	37.0185++ [0.0000]	37.9183++ [0.0000]	17.3290++ [0.0000]	165.7059++ [0.0000]	90.9655++ [0.0000]

++ Denotes an F-statistic that exceeds the Leamer-Schwarz critical values (L-S CV) from Table 2.

Notes: All estimations use 119,733 individuals (including the dummy observations) observed over a maximum of 24 months and include individual and time fixed effects; a quadratic function of age; and a complete set of interactions between dummies for Mar-Dec 15, Dec 14 – Jan 15, and Sep – Nov 14 with COFA and Japanese dummies. Standard errors adjust for clustering on individuals. The means corresponds to the COFA population before Mar 15. The tests for pre-trends and placebo effects are the F-tests described in Section IV. The DiD test is an F-test of the null COFA X Post is zero. p-values are reported in brackets.

Table 4: Fixed Effects DD Estimates: Over 65

Panel A	Inpatient Admissions			ER Visits		
Payer	Any	Medicaid	Private	Any	Medicaid	Private
COFA x Post	-0.0003 (0.0017)	-0.0008 (0.0015)	0.0004 (0.0003)	-0.0010 (0.0027)	0.0000 (0.0025)	0.0006 (0.0003)
Mean	0.0391	0.0331	0.0013	0.0688	0.0547	0.0035
Pre-Trend	0.3800	0.7447	0.7810	0.0712	0.1282	0.6638
	[0.6839]	[0.4749]	[0.4579]	[0.9312]	[0.8797]	[0.5149]
Placebo	2.5847	1.2874	2.1991	1.4405	0.0962	4.3785
	[0.0514]	[0.2767]	[0.0859]	[0.2288]	[0.9622]	[0.0044]
DiD	0.0384	0.2471	2.4781	0.1489	0.0002	2.6627
	[0.8447]	[0.6191]	[0.1154]	[0.6996]	[0.9896]	[0.1027]

Panel B	Inpatient Charges			ER Charges		
Payer	Any	Medicaid	Private	Any	Medicaid	Private
COFA x Post	-20.6567 (108.1417)	-55.5405 (102.4201)	5.2626 (12.4262)	-4.4402 (10.9004)	3.2437 (9.8922)	-1.0599 (2.7382)
Mean	1939.5305	1710.2303	55.0048	224.6006	177.1863	15.8789
Pre-Trend	1.4053	0.9825	0.8840	0.4831	0.4169	1.0499
	[0.2453]	[0.3744]	[0.4132]	[0.6169]	[0.6591]	[0.3500]
Placebo	1.4518	0.4839	1.8002	2.3795	0.5827	2.9793
	[0.2256]	[0.6934]	[0.1447]	[0.0676]	[0.6263]	[0.0301]
DiD	0.0365	0.2941	0.1794	0.1659	0.1075	0.1498
	[0.8485]	[0.5876]	[0.6719]	[0.6838]	[0.7430]	[0.6987]

++ Denotes an F-statistic that exceeds the Leamer-Schwarz critical values (L-S CV) from Table 2.
Notes: All estimations use 54,397 individuals (including the dummy observations). All other notes per Table 3.

Table 5: Fixed Effects DD Estimates: Utilization by the Uninsured

	Ages 18-64		Over 65	
	Inpatient	ER	Inpatient	ER
COFA x Post	0.0003 (0.0001)	0.0035 (0.0004)	-0.0002 (0.0003)	-0.0011 (0.0005)
Mean	0.0013	0.0126	0.0010	0.0045
Pre-Trend	5.5432	14.3896	3.1792	0.7310
	[0.0039]	[0.0000]	[0.0416]	[0.4814]
Placebo	6.1484	15.3646	0.2975	1.2680
	[0.0004]	[0.0000]	[0.8273]	[0.2834]
DiD	13.2243++	83.3567++	0.3722	4.5864
	[0.0003]	[0.0000]	[0.5418]	[0.0322]

++ Denotes an F-statistic that exceeds the Leamer-Schwarz critical values (L-S CV) from Table 2.
Notes: All outcomes are counts of admissions per patient/month charged to the individual. All other notes are per Table 3.

Table 6: Fixed Effects DD Estimates: Effects on Children (Ages 1-17) and Infants

	Inpatient Admissions		ER Visits		Inpatient Charges		ER Charges	
COFA x Post	-0.0089 (0.0011)	-0.0014 (0.0003)	-0.0067 (0.0013)	-0.0045 (0.0012)	-142.3976 (31.9292)	-19.1973 (16.2368)	-8.8337 (2.1231)	-3.8252 (1.9784)
COFA x Post X Infant		-0.1242 (0.0161)		0.0552 (0.0108)		-1798.0105 (446.4086)		63.4868 (18.0931)
Means								
Ages 0-18	0.0157		0.0808		326.7330		108.6253	
Ages 1-17		0.0042		0.0733		123.5802		96.9402
Infants		0.0791		0.1222		1446.6331		173.0406
DiD								
Ages 0-18	71.3588++ [0.0000]		25.6885++ 0.0000		19.8897++ [0.0000]		17.3125 0.0000	
Ages 1-17		19.1256++ [0.0000]		13.0516++ [0.0003]		1.3979 [0.2371]		3.7384 [0.0532]
Infants		60.0226++ [0.0000]		22.3553++ [0.0000]		16.4239++ [0.0001]		10.9724 [0.0009]

++ Denotes an F-statistic that exceeds the Leamer-Schwarz critical values (L-S CV) from Table 2.

Notes: All outcomes were reimbursed by Medicaid. All specifications correspond to those from Table 2 except that the specification in the odd columns includes a triple interaction between COFA, post, and infant (as well as all the other associated interactions). We report the COFA/post/infant and the COFA/post interactions in the odd columns. All other notes are per Table 3. To economize on space, we do not report specification tests but we do report them in Table A4.

Table A1: Fixed Effects DD Estimates: Ages 18-64 (Alternative Weights)

Panel A	Inpatient Admissions			ER Visits		
Payer	Any	Medicaid	Private	Any	Medicaid	Private
COFA x Post	-0.0006	-0.0025	0.001	-0.0040	-0.0121	0.0056
	(0.0003)	(0.0003)	(0.0002)	(0.0007)	(0.0010)	(0.0005)
Mean	0.0190	0.0151	0.0021	0.0724	0.0445	0.0124
Pre-Trend	0.7713	0.1321	1.3102	1.1780	4.6055	1.3340
	[0.4624]	[0.8762]	[0.2698]	[0.3079]	[0.0100]	[0.2634]
Placebo	0.7098	0.2754	0.0974	7.3888	4.2839	2.9979
	[0.5460]	[0.8432]	[0.9615]	[0.0001]	[0.0050]	[0.0294]
DiD	4.0765	74.0300++	75.6931++	37.2846++	160.6328++	112.4160++
	[0.0435]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]

Panel B	Inpatient Charges			ER Charges		
Payer	Any	Medicaid	Private	Any	Medicaid	Private
COFA x Post	-17.1461	-92.0114	56.4979	-8.4763	-28.6748	13.9160
	(16.9430)	(15.2747)	(9.4174)	(1.9138)	(2.3244)	(1.5304)
Mean	596.1473	470.1159	63.2815	170.1833	104.0121	28.0643
Pre-Trend	0.4772	1.6967	0.9150	0.2270	4.3654	0.2667
	[0.6205]	[0.1833]	[0.4005]	[0.7969]	[0.0127]	[0.7659]
Placebo	1.2045	0.0685	1.6232	4.8178	5.4955	0.6991
	[0.3064]	[0.9767]	[0.1816]	[0.0023]	[0.0009]	[0.5525]
DiD	1.0241	36.2861++	35.9914++	19.6158++	152.1830++	82.6785++
	[0.3115]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]

++ Denotes an F-statistic that exceeds the Leamer-Schwarz critical values (L-S CV) from Table 2.

Notes: Per Table 3. Additionally, the results in this table employ alternative weights based off the 5-year ACS count of Micronesian in Hawaii plus its margin of error, which is 31,653.

Table A2: Fixed Effects DD Estimates: Ages 18-64, Admissions and Charges in Logs

Payer	Medicaid	Private	Medicaid	Private
COFA x	-0.0109	0.0054	-0.1172	0.0597
Post	(0.0008)	(0.0005)	(0.0087)	(0.0051)
Mean	0.0392	0.0097	0.4334	0.1054
Pre-Trend	4.5164	1.1356	4.4182	1.0132
	[0.0109]	[0.3212]	[0.0121]	[0.3630]
Placebo	3.3686	1.8441	2.3618	1.1091
	[0.0177]	[0.1367]	[0.0692]	[0.3439]
DiD	181.5116^{++}	137.6429^{++}	180.1169^{++}	136.4986^{++}
	[0.0000]	[0.0000]	[0.0000]	[0.0000]

++ Denotes an F-statistic that exceeds the Leamer-Schwarz critical values (L-S CV) from Table 2.

Notes: Per Table 3.

Table A3: Fixed Effects DD Estimates by Gender: Ages 18-64

Panel A: Females	Inpatient Admissions			ER Visits		
Payer	Any	Medicaid	Private	Any	Medicaid	Private
COFA x	-0.0009	-0.0036	0.0025	-0.0054	-0.0176	0.0089
Post	(0.0005)	(0.0005)	(0.0003)	(0.0011)	(0.0017)	(0.0010)
Mean	0.0190	0.0151	0.0021	0.0724	0.0445	0.0124
Pre-Trend	0.5692	0.0043	0.8515	0.2839	2.2704	0.9259
	[0.5660]	[0.9957]	[0.4268]	[0.7529]	[0.1033]	[0.3962]
Placebo	0.5385	0.0495	0.2075	2.0092	3.2555	2.3844
	[0.6559]	[0.9854]	[0.8913]	[0.1103]	[0.0207]	[0.0672]
DiD	2.7004	44.8785++	52.3624++	23.5485++	107.5903++	85.9938++
	[0.1003]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]

Panel B: Males	Inpatient Admissions			ER Visits		
Payer	Any	Medicaid	Private	Any	Medicaid	Private
COFA x	-0.0004	-0.0021	0.0013	-0.0036	-0.0097	0.0035
Post	(0.0004)	(0.0004)	(0.0002)	(0.0010)	(0.0012)	(0.0007)
Mean	0.0190	0.0151	0.0021	0.0724	0.0445	0.0124
Pre-Trend	0.2259	0.5791	0.5453	0.7549	2.9059	0.7905
	[0.7978]	[0.5604]	[0.5796]	[0.4701]	[0.0547]	[0.4536]
Placebo	0.3832	0.6447	0.3490	6.7923	3.5750	1.2153
	[0.7651]	[0.5862]	[0.7899]	[0.0001]	[0.0133]	[0.3023]
DiD	0.9014	33.9713++	28.6195++	13.5057++	69.5309++	29.3339++
	[0.3424]	[0.0000]	[0.0000]	[0.0002]	[0.0000]	[0.0000]

++ Denotes an F-statistic that exceeds the Leamer-Schwarz critical values (L-S CV) from Table 2.

Notes: All estimations use 63,017 females and 56,716 males (including the dummy observations). All other notes per Table 3.

Table A4: Specification Tests from Children's Estimations

	Inpatient Admissions	ER Visits	Inpatient Charges	ER Charges
		Pre-Trends		
Ages 0-17	11.0724	20.0813	3.1453	16.2097
	[0.0000]	[0.0000]	[0.0431]	[0.0000]
Ages 1-17	2.0817	15.6136	0.5848	10.7813
	[0.1247]	[0.0000]	[0.5572]	[0.0000]
Infants	6.5557	8.3530	2.9887	7.6903
	[0.0014]	[0.0002]	[0.0504]	[0.0005]
		Placebo		
Ages 0-17	1.4400	1.4516	1.6234	1.3037
	[0.2289]	[0.2256]	[0.1816]	[0.2712]
Ages 1-17	0.6925	1.5714	0.2813	1.6284
	[0.5565]	[0.1940]	[0.8389]	[0.1804]
Infants	3.3780	0.5439	0.7182	0.4467
	[0.0175]	[0.6522]	[0.5410]	[0.7196]
		DiD		
Ages 0-17	71.3588^{++}	25.6885^{++}	19.8897^{++}	17.3125^{++}
	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Ages 1-17	19.1256^{++}	13.0516^{++}	1.3979	3.7384
	[0.0000]	[0.0003]	[0.2371]	[0.0532]
Infants	60.0226^{++}	22.3553^{++}	16.4239^{++}	10.9724
	[0.0000]	[0.0000]	[0.0001]	[0.0009]

++ Denotes an F-statistic that exceeds the Leamer-Schwarz critical values (L-S CV) from Table 2.
Notes: Reports specification tests from the estimations in Table 7. For information on the specification tests, we refer the reader to Section 4 of the paper.

Figure 1: Utilization by Race

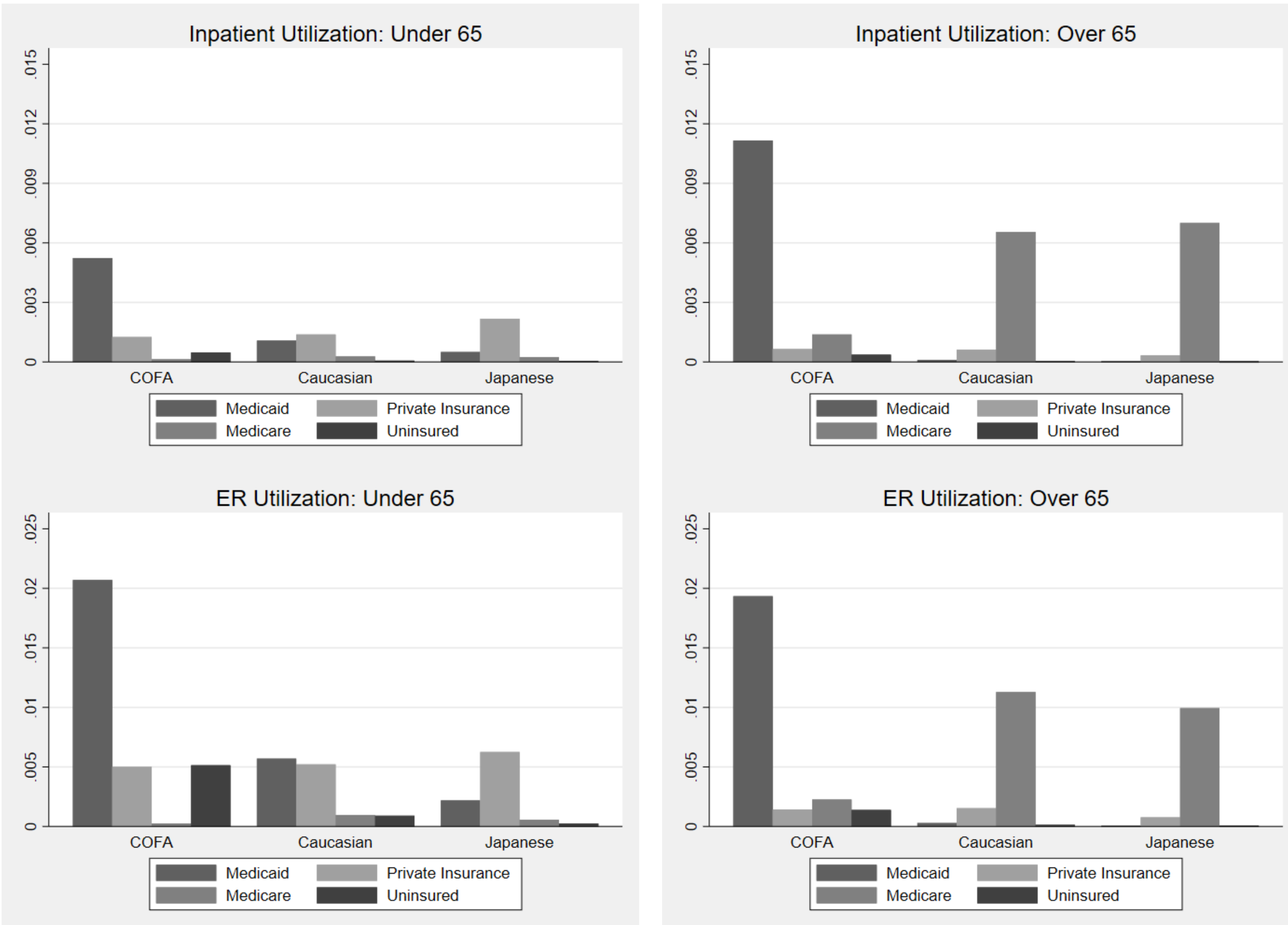

Figure 2: Event Analysis, Ages 18-65

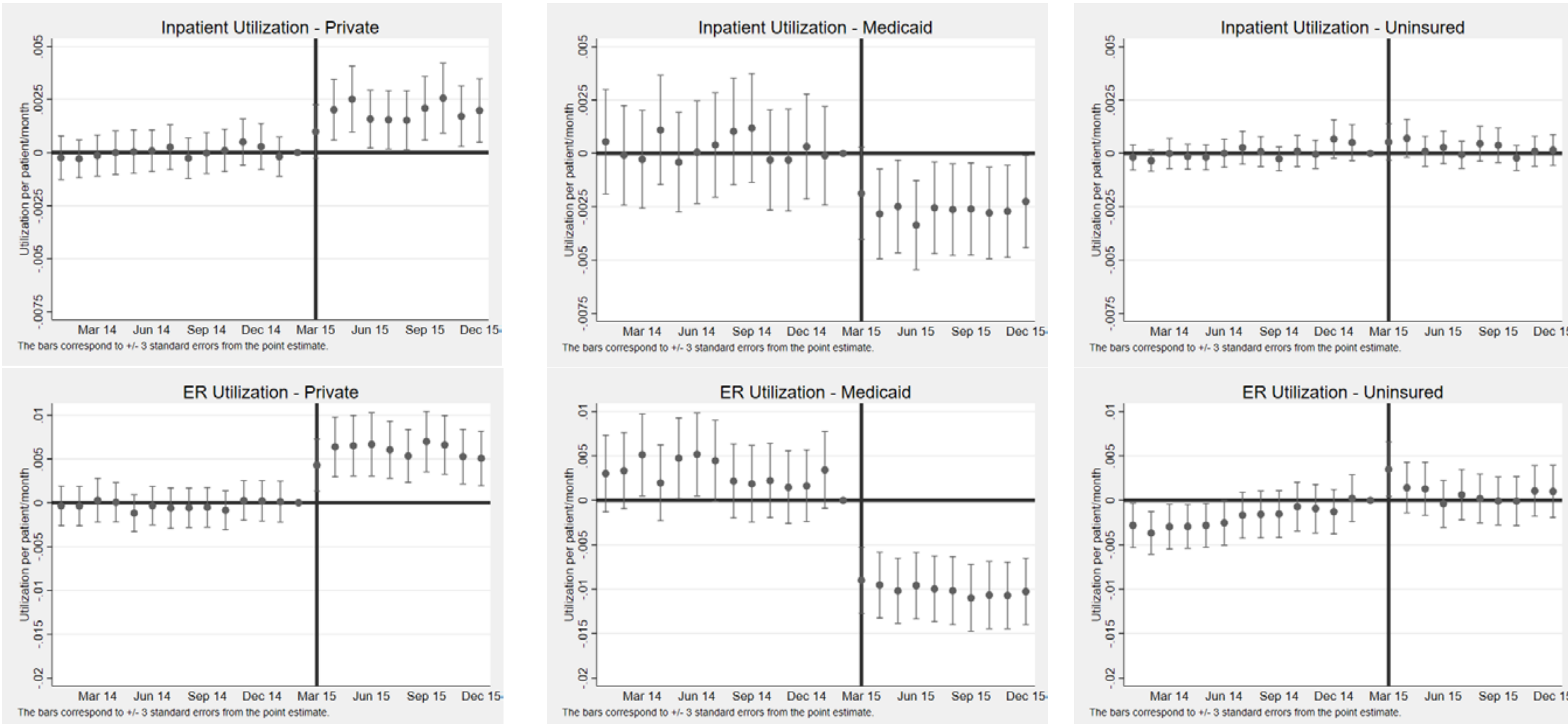

Figure 3: Age Profiles of Treatment Effects