The Impact of Public Health Insurance on Medical Utilization in a Vulnerable Population: Evidence from COFA Migrants

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<u>Abstract</u>

In March of 2015, the State of Hawaiʻi stopped covering migrants of countries belonging to the Compact of Free Association (COFA) in the state Medicaid program, forcing COFA migrants to obtain private insurance in health insurance exchanges established under the Affordable Care Act. Using statewide administrative hospital discharge data, we show that Medicaid-funded hospitalizations and emergency room visits declined in this population by 37 and 32%, respectively, after the expiration of Medicaid eligibility. Utilization funded by private insurance did increase but not enough to offset the declines in publicly-funded utilization, resulting in a net decline. An exception to this is that infants born to COFA migrants were substantially more likely to be hospitalized after Medicaid benefits expired.

Key words: 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, such 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 insurance coverage for its poorest citizens, the State of Hawai‘i reduced its coverage for a small but vulnerable portion of its population. Up until March of 2015, the State of Hawai‘i enrolled migrants of countries belonging to the Compact of Free Association (COFA) in a state 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 Hawai‘i had roughly 34,000 COFA migrants (commonly referred to as “Micronesians”), most of whom were not US citizens, but under the terms of the federal Compact, they are guaranteed certain prerogatives such as access to public health insurance and free entry to the US. In general, Medicaid is jointly financed by federal and state governments, but federal welfare reform in 1996 suspended federal funds for these populations through Medicaid. Despite lack of federal Medicaid financing for COFA migrants, the State of Hawai‘i continued to generously provide coverage to state-funded health insurance in various forms, including a state Medicaid plan

[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 were provided access to medical coverage such as Medicaid and other governmental and social services.

provided by the State of Hawaiʻi Medicaid agency (called Med-QUEST). Due to a court ruling in April of 2014, however, state Medicaid coverage for this population was suspended.[2] As a consequence, COFA migrants were ultimately denied access to Medicaid benefits in March of 2015. Instead, they were required to purchase private insurance in the health insurance exchanges newly established by the ACA, but they were not eligible for the Medicaid expansion (McElfish, et al. 2015). In this paper, we investigate how the expiration of these benefits impacted inpatient admissions and emergency visits in this population.

The expiration of public insurance benefits could have impacted the medical utilization of COFA migrants in two ways. The first is that it could increase 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, the practice of providers charging patients for what insurers do not reimburse. Theoretically, this increase in prices is expected to reduce the consumption of medical services. Indeed, 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 second way of impacting utilization is that 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. In the transition from Medicaid enrolment to private insurance, COFA migrants might have gone uninsured after the expiration of Medicaid benefits, potentially resulting in an increase in out-of-pocket expenses or at least medical charges to individuals. Lower insurance coverage take-up is likely, given that education levels and literacy rates are substantially lower for this population compared to other ethnic groups. Akee (2010) showed that 7.8% of adult male immigrants from the FSM have no education, 6.5% have between one and six

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

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.

In this paper, we employ statewide administrative data of all hospital discharges in Hawai‘i to estimate the effects of expiring Medicaid 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 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 Hawai‘i Medicaid (hereafter referred to as ‘Medicaid’) after the expiration of benefits for COFA migrants. In particular, Medicaid-funded ER visits and inpatient admissions declined by 32 and 37%, respectively. This sharp reduction in utilization is consistent with other studies that have investigated the impact of the expiration of Medicaid benefits, e.g. in Tennessee after it discontinued Medicaid benefits after a previous expansion in 2005 (see DeLeire 2018, Tarazi 2017, Tello-Trillo 2016). At the same time, there was a substantial increase in the number of emergency visits and inpatient admissions charged to private payers, indicating that there was a move towards private insurance among COFA migrants after Medicaid 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.

Another key finding of this study is that, while utilization in the COFA population declined overall, inpatient admissions and emergency room visits of infants born to COFA migrants *increased* as a consequence of the policy change. Due to limitations of the hospital discharge dataset, the precise mechanism underlying this finding is unknown. We speculate that one possible explanation may be that pregnant mothers received less pre-natal care and subsequent post-natal care, which increased the need for emergency and inpatient care for newborn children. Higher prices of outpatient care under private insurance relative to Medicaid could lead to lower outpatient care and subsequently higher inpatient care that may have been preventable with outpatient care.

As pointed out by Einav and Finkelstein (2018), how medical utilization responds to out-of-pocket costs has been a source of debate for quite some time. Since the RAND Health Insurance Experiment and subsequent studies, the prevailing evidence suggests that the demand for medical care slopes downward. The bulk of our results are consistent with this view. However, a competing view is that the demand for medical care slopes *upwards* so that people facing the lowest cost sharing consume the least during the course of year (Einav and Finkelstein, 2018). The idea is that consuming health care that is ostensibly preventative in nature today can forestall the need for costlier care in the future.[3] Some ACA-related policy discussions invoked the concept that expanded access to insurance would allow people to consume cheaper preventive care rather seek treatment in the ER.[4] In contrast to this view, however, evidence from the Oregon Health Insurance Experiment (Finkelstein et al, 2012) showed the opposite, namely, that randomized access to Medicaid *increases* ER utilization which is also a finding in this study for most age groups that we consider. However, we also find evidence of an increase in utilization among infants born into COFA families *after* the expiration of Medicaid benefits. This finding is suggestive of an upward sloping demand curve for pregnant mothers and their children.

We conclude that these results provide additional evidence on the responsiveness of the demand for health services to the cost of services. The removal of publicly-provided health insurance results in some shifting towards private insurance (possibly under the insurance exchanges established under the ACA). However, this shift does not fully compensate for the decline in utilizations previously financed by Medicaid. Overall, our results suggest that there are now COFA migrants forgoing health care services as a result of Medicaid expiration.

The balance of this paper is as follows. In the next section, we provide some institutional background on the history of COFA migrants in Hawai‘i and their ability to access health insurance. After that, we discuss the discharge data that we employed and how we used it to

[3] For example, the model presented in Goldman and Philipson (2007) is very much in this spirit.
[4] See Einav and Finkelstein (2018) for a discussion in the case of Michigan’s expansion of its Medicaid program after the implementation of the ACA.

construct an individual level panel. We then discuss the methods that we employ and after that, we discuss our results and conclude.

II. Some Institutional Background

Publicly-sponsored health care coverage for COFA migrants by the State of Hawai‘i 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 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. 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 not classified as immigrants but instead are classified 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 Hawai‘i 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 federal not state policy, the financial responsibility for providing these benefits has often been viewed as disproportionately burdensome to the State of Hawai‘i, 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% 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 Hawaiʻi 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. A lawsuit was filed and 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 Hawaiʻi 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 who were not aged, blind or disabled (ABD) became ineligible for Medicaid benefits beginning in March of 2015 (Hawaii DHS, 2014; McElfish et al, 2015). Beginning in March of 2015, Medicaid coverage effectively ended for COFA migrants in the State of Hawaii except for children, pregnant women, and people who were ADB. Legally residing children and pregnant women remained eligible for Medicaid from Children's Health Insurance Program Reauthorization Act (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 told to buy private health insurance on the Hawaii Health Connector, the state's health insurance exchange. 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 who were 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 Hawai‘i Medicaid coverage.[5] 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, and in 2015, only a few months after the enrollment period, 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 in using Healthcare.gov, further causing confusion and necessitated outreach to the COFA community (Princeton, 2017). Unlike the Hawaii Health Connector, Healthcare.gov is not available in COFA languages, adding more challenges to this new enrollment (Princeton, 2017).[6]

III. Data

The data used in this study are provided by the Hawaii Health Information Corporation (HHIC), a private, not-for-profit organization based in Honolulu, Hawai‘i. HHIC collected data from hospitals in Hawai‘i. Its catchment area included all hospitals in the State of Hawai‘i except for Tripler Army Medical Center. The data were thus nearly a census.

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 of Japanese, Caucasian, and 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 Hawai‘i. These data include information on the type of discharge (i.e. inpatient or ER), admission and discharge dates, ethnicity (e.g. Micronesian, Japanese, or

[5] There appear to have been practical difficulties in applying for the premium assistance program. For example, if a migrant does not properly file a 1095A tax form, they are disenrolled. In addition, all correspondence concerning the program is sent in English. Finally, in each year a person applies to the premium assistance plan, the individual must first receive a denial letter from Med-QUEST stating that they are ineligible for the QUEST program.
[6] In 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).

Caucasian), gender, age, payer type (e.g. Medicaid, private insurance), total billed/charged, and 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.

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 205,688 individuals and 4,936,471 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 2014-2015. 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 counts from the ACS correspond to people who report Micronesian, Japanese, or White as one of their ethnicities. Accordingly, we account for the possibility that people can have multiple ethnicities which is a feature of the HHIC data. Our estimates of ACA-based population of

Micronesians, Japanese, and Whites are, respectively, 33,976, 310,595, and 604,474, whereas corresponding counts in the HHIC data are 11,530, 63,174, and 131,510 indicating that there are many missing zeros from our panel.

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 for additional details).

Summary statistics on utilization and charges from the panel are reported in Tables 1c and 1d. All statistics use the frequency weights and hence 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."

In the top panel of Table 1c, we see that on average there were 0.0043 inpatient admissions and 0.0134 emergency room visits per person-month. This translates to an inpatient admission about every 19 years and an ER admission about every 6 years for entire population. On average, total charges per person-month for all admissions (i.e. inpatient and ER) were \$181.17. The average amount charged to Medicaid was \$33.95 and to private payers was \$47.91. 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. We do this to provide the reader with a baseline to which they should compare the treatment effects that we will compute. The table shows that COFA migrants are sicker than the overall study sample. For example, the mean of hospital admissions per person-month among COFA migrants under 65 was 0.0061, whereas it was 0.0032 for the entire sample under age 65 in the previous table. Accordingly, the hospitalization rate for COFA migrants is twice that of the study sample. Similarly, the lower health status among COFA migrants is also observed by the observation that Micronesians accounted for 6.3% of the study discharges for the three ethnicities, but 3.6% of the state's population of the corresponding ethnicities.

In Figure 1, we display histograms depicting total admissions per person-month charged to Medicaid, private insurance, Medicare, and the individual by ethnic group. 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, during 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 than either the Japanese or Caucasians (see bottom row of the figure).

IV. Methods

To identify the effects of the move to private insurance on medical utilization among COFA migrants, we employ a difference-in-difference (DD) research design with individual fixed effects. We let y_{it} denote a particular outcome for individual i at time t. The time period in our study is the 24 months between January 2014 and December 2015. The main outcomes that we consider are the total number of inpatient admissions or ER visits in a month and the corresponding total amount charged. We further disaggregate visits by charges to Medicaid, to private insurance, or to the individual.

Our main analysis can be thought of as examining the effect of the change in publicly-provided health insurance on different types of health services. We ask whether there is a change in the total inpatient admissions or ER visits as a result of the program change. We then separate out the outcome variable by whether the subsequent health services were paid by private insurance or Medicaid. Treatment is identified by ethnic group. The treatment group is the COFA population which is identified as “Micronesian” in our data. For convenience, we have chosen Caucasians as the control group and Japanese as placebo group (and the results are the same regardless of designation).

For a given outcome variable y_{it} , the main estimation equation that we employ can then be expressed as:

$$y_{it} = \alpha_i + \vartheta POST_t + \pi POST_t * JP_i + \tau POST_t * COFA_i + g(age_{it}) + \varepsilon_{it} \tag{1}$$

where $POST_t$ is a dummy variable that is equal to one when the calendar month is between March 2015 and December 2015, JP_i is a dummy for an individual of Japanese ethnicity, $COFA_i$ is a dummy that is equal to one if the individual is Micronesian, and age_{it} is the individual’s age at time t. The parameter α_i is an individual fixed effect that adjusts for any unobserved time-invariant characteristics that might impact medical demand or might be associated with treatment. The parameter π is the coefficient on the placebo and is expected to be zero. Our parameter of interest is τ, the difference-in-difference estimate of the effect of the change in coverage on medical utilization. We clustered all standard errors by individuals.

We can modify equation (1) to account for a richer form of heterogeneity. Specifically, we consider the following variant:

$$y_{it} = \alpha_i + \rho_i t + \vartheta POST_t + \pi POST_t * JP_i + \tau POST_t * COFA_i + \varepsilon_{it} \tag{2}$$

which includes a heterogeneous trend given by $\rho_i t$. Note that the heterogeneous trend basically obviates the need for adjusting for age. This specification hedges against some violations of the parallel trends assumption required in the DD model since the trend is allowed to vary across individuals. To estimate this model, we first difference the model to obtain

$$\Delta y_{it} = \rho_i + \vartheta \Delta POST_t + \pi \Delta POST_t * JP_i + \tau \Delta POST_t * COFA_i + \Delta \varepsilon_{it}$$

and, so the coefficient on the trend becomes a fixed effect in the first differenced model. We then apply the standard within group estimator to the first differenced model given above to estimate τ. This specification requires parallel trends in the model in first differences but allows for violations of the parallel trends assumption in levels.

Finally, we also estimate two variants of equation (1). The first is a standard event analysis. For these estimations, we include a complete set of time dummies and their interactions with the COFA dummy. These estimations will also shed light on the parallel trends assumption. The second allows us to investigate heterogeneity in the treatment effect by age. For these estimations, we include a complete set of age dummies as well as their interactions with the COFA dummy.

V. Results

Core Results

Our core results from the fixed effect DD model are reported in Table 2. The table reports the results of 18 estimations for people under 65 years of age. For each of the estimations, we report the coefficient on the post-dummy as well as the treatment effect on the COFA population and the placebo estimate corresponding to the interaction of the post and Japanese dummies.

In the first panel of Table 2, we look at the effects of the policy change on inpatient admissions and ER visits. For each outcome, we consider admissions funded by any payer, by Medicaid, and by private insurers. In the first column of this panel, we see that the policy had a small negative impact on all inpatient admissions with a coefficient estimate of -0.0006 ($p<0.10$). Note that this effect is inclusive of those that were funded by Medicaid and those that were funded by private insurance. In the fourth column of the same panel, we see a larger reduction in ER visits of 0.0019 ($p<0.001$) per person-month. These estimates imply that there were roughly 127 fewer inpatient admissions and 400 fewer ER visits among the COFA migrants over the 10 month period from March 1, 2015 to December 31, 2015.[7] Finally, because we see declines in both inpatient admissions and ER visits together, this is suggestive that the two types of utilizations are complements not substitutes as others have suggested.

[7] To see this, note that there were roughly 21,187 COFA migrants under 65 years in Hawai‘i at this time. Accordingly, we will have that 0.0006*21,099*10=127.

Next, looking at utilization disaggregated by type of insurer, we see that utilization charged to Medicaid declined whereas those charged to private insurance increased. However, the magnitudes of the former effects are larger than those for the latter effects which is what underlies the net negative impacts that we see in the first and fourth columns. In the second and fifth columns, we see that inpatient admissions and ER visits that were charged to Medicaid declined by 0.0019 (p<0.01) and 0.0062 (p<0.01) per person-month. The means of inpatient admissions and ER visits among COFA migrants that were charged to Medicaid in the pre-policy period were 0.00505 and 0.01918 in Table 1d. Accordingly, these effects amount to 37 and 32% decreases. In contrast, inpatient admissions and ER visits charged to private insurance increased by 0.0013 (p<0.01) and 0.0035 (p<0.01), respectively. Compared to the means of 0.00055 and 0.00269 of inpatient admissions and hospital admissions from Table 1d, these effects represent 241 and 130% increases. These large numbers are entirely attributable to the fact that the vast majority of COFA migrants were not enrolled in private insurance pre-policy. On the whole, this indicates that the policy worked as expected with a shift in financing away from Medicaid and towards private insurers. One important implication is that, since out-of-pocket costs for ER visits tend to be higher for the private insurers (and the uninsured) than for Medicaid, there was a large demand response of the COFA population to higher costs of hospitalizations and ER visits after the implementation of the policy.

The second panel of Table 2 reports the effects for total utilization which is the sum of total inpatient admissions and ER visits. The first three columns of the panel, mechanically, are the sum of the impacts on inpatient admissions and ER visits from the first panel. In the first column, we see that, on net, utilization decreased by 0.0025 (p<0.01) admissions per person-month. The next two columns indicate that total utilization charged to Medicaid declined by 0.0081 (p<0.01) and those charged to private insurers increased by 0.0048 (p<0.01). The final three columns are analogous to the first three columns except that we use the log of total utilization as the dependent variable. We do this as a robustness check against potential outliers. All three estimates are significant at the 1% level. Note that because of the zeros in the data, it is not correct to interpret these estimates as percentages.

The third panel reports the effects on total charges (of both inpatient admissions and ER visits) and the log of total charges. In the first column, we do not see any evidence that the level of total charges was impacted by the policy. However, in the fourth column, we see evidence that the policy impacted the log of total charges; the DD estimate is -0.02 ($p<0.01$). Breaking these charges down by those charged to Medicaid and to private insurance, we see that charges to Medicaid declined by \$60.87 ($p<0.01$) per person-month in the second column and those charged to private insurers, in the third column, increased by \$52.35 ($p<0.01$). Using the figures from Table 1d, these correspond a 35% decline and a 253% increase, respectively. Finally, the estimates using log charges in the final three columns of this panel are all significant suggesting that our results are not driven by outliers.

The placebo interactions in Table 2 are generally insignificant. Of the 18 separate estimations, only two of the placebo interactions are significant but only at the 10% level. This is most likely due to Type I error. This strongly indicates that our findings are identifying the effects of the expiration of Medicaid benefits on utilization in the COFA population and not an omitted trend.

In Table 3, we estimate the same models as in the first panel of Table 2 using inpatient admissions and ER visits as the dependent variables with alternative estimators. The first panel extends the fixed effects model estimated in Table 2 to allow for a heterogeneous trend as in equation (2). The second panel employs OLS. Finally, the third panel employs a standard fixed effects model as in Table 2. These estimations are identical to the first panel of Table 2 and are reported for the easier comparisons.

The estimations with the heterogeneous trends in the first panel are broadly consistent with the standard fixed effects estimations in the bottom panel. The key difference is that the standard errors are substantially larger and the point estimates are attenuated. As a consequence, some of the estimates that were significant in the fixed effects model are not significant once we allow for the heterogeneous trend. We attribute this issue to power as the estimates in the first panel of the table essentially rely on a double difference of the original data. That said, the main findings from Table 2 are still present in this more robust model. For example, we see that inpatient admissions charged to private payers increase by 0.0007 ($p<0.10$) per person-month and ER visits also charged to private payers increase by 0.0023 ($p<0.001$) per person-month. Similarly, we see that inpatient admissions charged to Medicaid decline by 0.0011 ($p<0.10$) and ER visits charged to Medicaid decline by 0.0034 ($p<0.05$) per person-month.

In the second panel of Table 3, we report estimations for the same outcomes using OLS. These estimations tend to be very similar to the fixed effects estimations in the bottom panel of the table with similar standard errors.

Next, in Table 4, we estimate the same models as in Table 2 but now we restrict the population to people over 65 years of age. On the whole, we see few impacts of the policy change in this older population. First, we see no effects for any admissions that were charged to Medicaid. We do, however, see modest effects on admissions that were charged to private payers, although relative to the corresponding effects in Table 2, these estimates are attenuated and tend to have higher *p*-values associated with the estimates. For example, in the third column of the first panel, we see that the policy change increased hospital admissions charged to private payers by 0.0005 (p<0.10) per person-month. By way of comparison, the analogous estimate from Table 2 is 0.0013 (p<0.01). Similarly, in the population 65 years and older, we see that the policy change increased ER visits charged to private payers by 0.0006 (p<0.10) whereas the effect in the population under 65 was 0.0035 (p<0.01). The null effects for Medicaid-charged admissions suggest that older COFA migrants continued to receive care from public insurance both before and after the policy change. However, the modest increase in admissions charged to private payers for the older population does indicate that the policy also impacted older COFA migrants.

This could have happened for two reasons. First, younger COFA migrants who enrolled in private insurance may have claimed older relatives or spouses as dependents on their policies. Second, the push to enroll COFA migrants in private plans after the policy's implementation may have also caused older migrants to enroll.

Event Analysis

In Figure 2, we report the results of an event analysis. The figure contains six graphs which display coefficients on the interactions between 24 month-dummies and the COFA migrant dummy from a model that is otherwise similar to equation (1). The first row displays figures for inpatient admissions and ER visits funded by any payer. The second row displays figures for admissions charged to Medicaid and the final row displays admissions charged to private insurance. All six figures include a horizontal line at zero and a vertical line corresponding to 1 March 2015.

We see the following results. First, the interactions are not significantly different from zero in all six graphs prior to 1 March 2015. This provides some evidence that the trends were parallel across our ethnic groups, at least, in the pre-period. However, the figure in the second row and column corresponding to ER visits charged to Medicaid does show a dip in the pre-treatment period. This result may indicate that the impending change in state coverage of Medicaid for COFA migrants produced a response in emergency room visits prior to the actual change in the policy. Second, the first figure corresponding to inpatient admissions charged to any payer shows a small significant decline in the post-period indicating that there was, indeed, a net decline in inpatient utilization as a consequence of the policy. Third, the figure in the second column of the first row which corresponds to ER visits charged to any payer does show a significant decrease in the post-treatment period relative to the pre-treatment period suggesting that there was a net decline in ER visits attributable to the policy change. Fourth, in the second row of Figure 1, we see that both inpatient admissions and ER visits charged to Medicare declined after the policy's implementation. Finally, the third row indicates utilization that were charged to private insurers displayed no trends in the pre-treatment period but did increase substantially in the post-treatment period.

Results by Age and Gender

In Figure 3, we investigate how the effects of the policy varied by age. We estimated a variation of equation (1) in which we included a set of age dummies and their interactions with the COFA dummy. The age dummies correspond to five-year age bins, but we did use a separate age bin for children between zero and one year of age. For these estimations, we include individuals both under 65 years and 65 years and older.

The first row displays results for inpatient admissions and ER visits charged to any payer. The first figure corresponds to inpatient admissions and shows a flat profile close to zero with the exception of infants for whom we see a large positive effect. These age effects are very tightly estimated until 65 years after which the confidence bands around them become substantially larger. The large positive effect seen on infants underscores that the results from Table 2 mask some important heterogeneity. In particularly, while it does appear that the policy reduced most utilization, this was not the case for the youngest Micronesians. The second figure in the row shows a net decrease in ER visits for most ages up until age 65 at which point the age effects are not significantly different from zero. The bulk of the decline in ER visits occurs for people between the ages of 30 and 65. Once again, we see an increase in ER visits for Micronesian infants after the policy's implementation. On the whole, this suggests that the health of the very young may have been adversely impacted by the policy change.

In the second row of Figure 3, we display results for inpatient admissions and ER visits charged to Medicaid. The two graphs show that the policy reduced these ER visits until 65 years of age, whereupon the effects are not significantly different from zero. The effects for ER visits are particularly pronounced in the second column. Importantly, the two figures in this row show that ER visits and inpatient admissions charged to Medicaid increased substantially for infants which is what underlies the corresponding increases seen in the first row of the figure. It is important to emphasize that the positive effects on infants are very large relative to the negative effects on other COFA migrants under 65 years. However, these negative effects are in fact significantly different from zero. This is more apparent in Figure A1 in which we plot the same estimates from the first figure in the second row with the omission of the infants. This figure clearly shows that there were negative and significant effects on Medicaid-charged hospital admissions.

Prima facie, the increase in inpatient admissions and ER visits for infants is 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). One possible explanation for this finding is that pregnant mothers received worse prenatal and/or postnatal care after the policy. The Medicaid coverage policy exception for pregnant women and children may not have been communicated well by Medicaid. As a potential result, this could have resulted in worse health outcomes for their children. If a health issue subsequently arose for these children, who may have been uninsured, the hospital may have billed it to Medicaid.

The final row of Figure 2 displays the results for utilization charged to private payers. Both figures in this row show modest increases in both inpatient admissions and ER visits for individuals below age 65, after which the effects become null. Importantly, the magnitude of the effects for ER visits charged to private insurers are substantially smaller than the corresponding effects for admissions charged to Medicaid indicating that the policy change did reduce utilization of emergency medical services.

In Table 5, we examined the impacts across gender. We report DD estimates of the effects of the policy on inpatient and ER visits charged to any payer, Medicaid, and private insurance. We further restrict the estimations to people under 65. The top panel displays impacts on females and the bottom panel displays impacts on males.

The main result in this table is that females were impacted more than males. For example, female COFA migrants saw a decline in inpatient admissions charged to Medicaid of 0.0023 ($p<0.01$) per person-month, whereas males saw a decline of 0.0013 ($p<0.01$) per person-month. The corresponding estimates for ER visits charged to Medicaid are -0.0088 ($p<0.01$) for females and -0.0035 ($p<0.01$) for males which again indicates an impact on females that is about twice as large as it is for males.

Effects on the Uninsured

We now look at how the uninsured were impacted by the policy change. It was widely suspected that many migrants did not enroll in private insurance in a timely manner. To shed light on this, we estimate our fixed effects DD model using inpatient admissions and ER visits that were not charged to any insurer (either public or private) as the dependent variable. We report the results in Table 6. The table displays four DD estimates corresponding to inpatient and ER visits for people who are under 65 years and separately those who are 65 years and older. We see impacts for COFA migrants under 65 years. Uninsured inpatient admissions increased by 0.0001 per person-month and uninsured ER visits increased by 0.0014 ($p<0.01$) per person-month. Note that the impact on uninsured ER visits is roughly half of the impact on ER visits charged to private insurers of 0.0035 from Table 2. In addition, the impact on ER visits charged to Medicaid in the same table was -0.0062. Accordingly, COFA migrants insured roughly 25% of the decline in ER visits induced by the policy with uninsured visits to ER. The last two columns show no impacts on uninsured admissions among older COFA migrants.

In Figures 4a and 4b, we report event analyses and age profiles of the DD estimates for uninsured admissions as we did in Figures 2 and 3. First, in the event analysis in Figure 4a, we see that we very large impacts of the policy on uninsured ER visits. However, this increase pre-dates 1 March 2015 which indicates that there may have been some anticipation of the policy change. However, it is important to note that the plot of Medicaid-charged ER visits from Figure

2 also shows a decline prior to the policy's implementation. This suggests that prior to the implementation of the policy there was a substitution away from Medicaid-charged ER visits towards uninsured admissions even when this was not necessary. This indicates a possibly uneven implementation of the policy. Second, in Figure 4b, we see that the bulk of the impacts on uninsured ER visits occurred for adults younger than 65. Note that we do not see large impacts on uninsured ER visits for infants. There were no impacts on COFA migrants 65 years and older. Finally, the effects on uninsured hospital admissions were smaller.

Effects on the Infants

Finally, we further explore how the policy change impacted the youngest Micronesians. To do this, we estimate a variant of equation (1) in which we include an infant dummy and its interaction with the COFA/POST variable. The idea of this is to shed light on how the policy impacted infants in a transparent way. We report the results in Table 7. We only consider admissions that were charged to Medicaid. The table consists of eight columns corresponding to four outcomes: inpatient admissions, ER visits, and inpatient and ER charges. For each outcome, we report the estimation of equation (1) which was also reported in Table 2 in the odd columns and, in the even columns, we report the results with the infant interaction.

The results indicate that the effects on the policy on infants were enormous. Looking at the first two columns where the dependent variable was inpatient admissions, we see that the raw impact of the policy was -0.0019 ($p<0.01$) in the first column. In the second column, the direct impact increases to -0.0029 ($p<0.01$), but the interaction with the infant dummy is 0.0605 ($p<0.01$). Accordingly, the net effect on infants was 0.0605-0.0029=0.058 inpatient admissions per person-month. The ratio of the magnitudes of direct effect and its interaction in the second column is 21. We see a similar phenomenon in the third and fourth columns where ER visits are the dependent variable. The fourth column shows a direct effect of the policy on ER visits of -0.0075 ($p<0.01$), but the interaction with the infant dummy is 0.0736 ($p<0.01$). This ratio is about 10. The net effect on ER visits for infants is 0.0661 ER visits.

The final four columns of the table report the effects on charges. These results indicate that the policy increased charges for inpatient admissions of Micronesian children by 1554.37-71.41= 1482.96 dollars per person-month. The corresponding number for ER visits was 108.88-17.01=91.87 dollars per person/month.

VI. Conclusions

In this paper, we investigated the effects of eliminating Medicaid coverage for a population in the State of Hawai‘i on their hospital and ER utilization. To do this, we employed a large administrative database that essentially constitutes a complete census of all inpatient and emergency room utilizations during 2014 and 2015. Difference-in-difference models indicate that the expiration of Medicaid benefits decreased Medicaid-funded inpatient and emergency room utilizations by 37% and 32%, respectively. Privately-funded utilizations increased by 241% (inpatient) and 130% (emergency room). On net, the magnitudes of the publicly-funded utilizations did not make up for the decline in Medicaid-funded utilizations resulting in a net decline in utilization after the expiration of Medicaid benefits. Importantly, some of the shortfall in Medicaid-funded utilizations was made up for by utilizations of uninsured patients. Finally, despite our finding that utilization on net decreased, we did show that Micronesian infants were more likely to be hospitalized after Medicaid benefits expired. This was the case despite the fact that the State of Hawaii made special arrangements to continue Medicaid benefits for pregnant Micronesian women.

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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. Focusing on the basic DD model in equation (1) and abstracting from the age function and the Japanese placebo group for the ease of notation, the DD parameter is

$$\tau = \{E[y_{it}|POST_t = 1, COFA_i = 1] - E[y_{it}|POST_t = 0, COFA_i = 1]\} \\ - \{E[y_{it}|POST_t = 1, COFA_i = 0] - E[y_{it}|POST_t = 0, COFA_i = 0]\}.$$

However, given our sampling issues, without any adjustment, in the HHIC data, we can identify the parameter

$$\tau^* = \underbrace{\{E[y_{it}|POST_t = 1, COFA_i = 1, S_i = 1] - E[y_{it}|POST_t = 0, COFA_i = 1, S_i = 1]\}}_{\Delta_1} \\ - \underbrace{\{E[y_{it}|POST_t = 1, COFA_i = 0, S_i = 1] - E[y_{it}|POST_t = 0, COFA_i = 0, S_i = 1]\}}_{\Delta_0}.$$

which, in general is not equal to τ. However, it turns out that

$$\tau = \omega_1\Delta_1 - \omega_0\Delta_0$$

where $\omega_d \equiv \frac{P(COFA_i=d,S_i=1)}{P(COFA_i=d)}$. For $d = 1$, the numerator in the weight is the probability of being a COFA migrant and in the HHIC data. The denominator is the probability of being a COFA migrant.

To see this, 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

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

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

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

.

Finally, if we assume that the likelihood of being in the COFA population is the same in the pre- and post-periods, then we obtain that

$$\omega_d E[y_{it} | POST_t = p, COFA_i = d, S_i = 1] = E[y_{it} | POST_t = p, COFA_i = d]$$

where $\omega_d \equiv \frac{P(COFA_i = d, S_i = 1)}{P(COFA_i = d)}$.

An important insight from the calculations above (namely equations (1a) and (1b)) is 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 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.

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%]

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

Self-reported ethnic group	HHIC	ACS	HHIC/ACS
Micronesian	11,530	33,976	34%
Japanese	63,174	310,595	22%
White/Caucasian	131,510	604,474	29%

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.

Table 1c: Descriptive Statistics from Panel Data

	Any Payer	Medicaid	Private	Uninsured
		All		
Inpt. Admissions	0.00431	0.00086	0.00134	0.00006
	(0.0691)	(0.0311)	(0.0380)	(0.0082)
ER Visits	0.01355	0.00412	0.00446	0.00069
	(0.1391)	(0.0825)	(0.0731)	(0.0291)
Total Charges	181.17	33.95	47.91	2.89
	(4101.91)	(1819.59)	(2028.17)	(309.47)
Inpt. Charges	149.27	25.68	37.52	1.40
	(4058.61)	(1794.52)	(2007.27)	(293.90)
ER Charges	31.89	8.27	10.39	1.49
	(413.14)	(213.27)	(217.28)	(88.32)
		Under 65 years		
Inpt. Admissions	0.00320	0.00108	0.00159	0.00008
	(0.0594)	(0.0348)	(0.0414)	(0.0090)
ER Visits	0.01378	0.00532	0.00547	0.00088
	(0.1409)	(0.0936)	(0.0810)	(0.0328)
Total Charges	121.82	41.77	54.21	3.45
	(3327.11)	(2000.25)	(2120.59)	(325.78)
Inpt. Charges	91.92	31.19	41.67	1.58
	(3283.15)	(1971.56)	(2097.47)	(307.49)
ER Charges	29.90	10.58	12.54	1.87
	(393.68)	(240.63)	(237.26)	(98.37)
		65 years and older		
Inpt. Admissions	0.00781	0.00016	0.00054	0.00002
	(0.0932)	(0.0135)	(0.0244)	(0.0048)
ER Visits	0.01283	0.00035	0.00127	0.00010
	(0.1333)	(0.0259)	(0.0390)	(0.0111)
Total Charges	367.82	9.36	28.10	1.12
	(5906.03)	(1067.69)	(1705.05)	(251.37)
Inpt. Charges	329.64	8.37	24.50	0.82
	(5859.47)	(1059.79)	(1692.49)	(246.34)
ER Charges	38.18	0.99	3.60	0.30
	(469.06)	(79.76)	(136.32)	(43.56)

Notes: Reports means and standard deviations in parentheses.

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

	Any Payer	Medicaid	Private	Uninsured
		All ages		
Inpt. Admissions	0.00638	0.00532	0.00053	0.00036
	(0.08253)	(0.0754)	(0.0239)	(0.0191)
ER Visits	0.02589	0.01898	0.00259	0.00350
	(0.1750)	(0.1511)	(0.0546)	(0.0633)
Total Charges	241.65	194.94	20.53	15.75
	(4969.58)	(4654.99)	(1206.30)	(666.23)
Inpt. Charges	191.02	159.49	14.68	8.21
	(4930.68)	(4625.16)	(1189.60)	(632.56)
ER Charges	50.63	35.45	5.85	7.55
	(462.03)	(371.62)	(165.41)	(192.01)
		Under 65 years		
Inpt. Admissions	0.00608	0.00505	0.00055	0.00036
	(0.0803)	(0.0733)	(0.0242)	(0.01931)
ER Visits	0.02617	0.01918	0.00269	0.00364
	(0.1762)	(0.1519)	(0.0555)	(0.0646)
Total Charges	219.45	174.21	20.66	15.88
	(4735.47)	(4409.44)	(1219.14)	(657.27)
Inpt. Charges	169.59	139.69	14.71	8.10
	(4697.40)	(4380.66)	(1203.84)	(621.98)
ER Charges	49.86	34.52	5.94	7.78
	(451.24)	(359.79)	(160.61)	(194.60)
		65 years and older		
Inpt. Admissions	0.01129	0.00977	0.00033	0.00026
	(0.1121)	(0.1046)	(0.0183)	(0.0161)
ER Visits	0.01942	0.01571	0.00093	0.00119
	(0.1519)	(0.1366)	(0.0350)	(0.0355)
Total Charges	610.94	539.81	18.37	13.56
	(7896.86)	(7653.90)	(967.92)	(800.66)
Inpt. Charges	547.66	489.00	14.07	9.89
	(7845.60)	(7610.44)	(920.74)	(787.99)
ER Charges	63.29	50.81	4.30	3.67
	(614.27)	(530.90)	(231.01)	(142.11)

Notes: Reports means and standard deviations in parentheses. All descriptive statistics correspond to the period prior to March 1, 2015.

Table 2: Fixed Effects DD Estimates: Under 65

Payer	Any	Medicaid	Private	Any	Medicaid	Private
		Inpatient admissions			ER visits	
JP	-0.0001	-0.0000	0.0000	-0.0002	-0.0002	0.0002*
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)
COFA	-0.0006*	-0.0019***	0.0013***	-0.0019***	-0.0062***	0.0035***
	(0.0002)	(0.0002)	(0.0002)	(0.0005)	(0.0006)	(0.0003)
		Total Utilization			Log Total Utilization	
JP	-0.0004	-0.0003	0.0003	-0.0003	-0.0001	0.0001
	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0001)
COFA	-0.0025***	-0.0081***	0.0048***	-0.0016***	-0.0052***	0.0031***
	(0.0006)	(0.0008)	(0.0005)	(0.0003)	(0.0005)	(0.0003)
		Total Charges			Log Total Charges	
JP	-3.36	-2.47	1.93	-0.00*	-0.00	0.00
	(5.13)	(2.20)	(3.49)	(0.00)	(0.00)	(0.00)
COFA	1.45	-60.87***	52.35***	-0.02***	-0.06***	0.03***
	(13.31)	(11.89)	(7.63)	(0.00)	(0.01)	(0.00)

*significant at the 10% level; **significant at the 5% level; ***significant at the 1% level

Notes: All estimations use 154,395 individuals (including the dummy observations) observed over a maximum of 24 months and include individual fixed effects, a dummy for the post-policy period, and a quadratic function of age as controls. JP is the interaction of the post dummy with the Japanese dummy. COFA is the interaction of the post dummy with the COFA dummy. Standard errors adjust for clustering on individuals.

Table 3: Alternative Estimations: Under 65

Payer	Any	Medicaid	Private	Any	Medicaid	Private
		Inpatient			ER	
			First Differenced-Fixed Effects			
JP	0.0000	0.0000	0.0001	-0.0004	-0.0003	-0.0001
	(0.0002)	(0.0001)	(0.0002)	(0.0005)	(0.0003)	(0.0003)
COFA	-0.0003	-0.0011*	0.0007*	0.0000	-0.0034**	0.0023***
	(0.0007)	(0.0006)	(0.0003)	(0.0015)	(0.0012)	(0.0006)
			OLS			
JP	-0.0001	-0.0000	0.0000	-0.0002	-0.0002	0.0003
	(0.0002)	(0.0001)	(0.0001)	(0.0004)	(0.0002)	(0.0002)
COFA	-0.0006*	-0.0019***	0.0012***	-0.0016**	-0.0060***	0.0035***
	(0.0003)	(0.0002)	(0.0001)	(0.0006)	(0.0006)	(0.0004)
			Fixed Effects			
JP	-0.0001	-0.0000	0.0000	-0.0002	-0.0002	0.0002*
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)
COFA	-0.0006*	-0.0019***	0.0013***	-0.0019***	-0.0062***	0.0035***
	(0.0002)	(0.0002)	(0.0002)	(0.0005)	(0.0006)	(0.0003)

*significant at the 10% level; **significant at the 5% level; ***significant at the 1% level

Notes: Per Table 2.

Table 4: Fixed Effects DD Estimates: Over 65

Payer	Any	Medicaid	Private	Any	Medicaid	Private
		Inpatient			ER	
JP	0.0000	0.0000	0.0001*	0.0000	0.0001*	0.0003**
	(0.0002)	(0.0000)	(0.0001)	(0.0003)	(0.0001)	(0.0001)
COFA	-0.0006	-0.0013	0.0005*	-0.0007	-0.0006	0.0006*
	(0.0011)	(0.0010)	(0.0002)	(0.0017)	(0.0015)	(0.0003)
		Total Utilization			Log Total Utilization	
JP	0.0001	0.0001	0.0004**	0.0001	0.0001**	0.0003**
	(0.0005)	(0.0001)	(0.0002)	(0.0003)	(0.0000)	(0.0001)
COFA	-0.0013	-0.0018	0.0011*	-0.0010	-0.0014	0.0008**
	(0.0022)	(0.0021)	(0.0004)	(0.0014)	(0.0013)	(0.0003)
		Total Charges			Log Total Charges	
JP	3.35	-0.12	2.08	0.00	0.00**	0.00**
	(12.63)	(1.53)	(3.44)	(0.00)	(0.00)	(0.00)
COFA	-17.55	-33.77	13.21	-0.01	-0.02	0.01**
	(78.92)	(76.15)	(9.99)	(0.02)	(0.01)	(0.00)

*significant at the 10% level; **significant at the 5% level; ***significant at the 1% level

Notes: All estimations use 54,331 individuals (including the dummy observations). All other notes are per Table 2.

Table 5: Fixed Effects DD Estimates by Gender: Under 65

Payer	Any	Medicaid	Private	Any	Medicaid	Private
		Inpatient			ER	
				Females		
JP	-0.0001	0.0000	0.0001	-0.0005	-0.0005*	0.0004*
	(0.0002)	(0.0001)	(0.0001)	(0.0003)	(0.0002)	(0.0002)
COFA	-0.0008*	-0.0023***	0.0016***	-0.0027***	-0.0088***	0.0049***
	(0.0003)	(0.0004)	(0.0002)	(0.0007)	(0.0011)	(0.0006)
				Males		
JP	-0.0001	-0.0001	0.0000	0.0000	0.0000	0.0001
	(0.0002)	(0.0001)	(0.0001)	(0.0003)	(0.0002)	(0.0001)
COFA	-0.0003	-0.0013***	0.0010***	-0.0011	-0.0035***	0.0019***
	(0.0003)	(0.0003)	(0.0002)	(0.0007)	(0.0007)	(0.0004)

*significant at the 10% level; **significant at the 5% level; ***significant at the 1% level

Notes: All estimations use 79,039 females and 75,356 males. All other notes are per Table 2.

Table 6: Fixed Effects DD Estimates: Utilization by the Uninsured

	Under 65		Over 65	
	Inpatient	ER	Inpatient	ER
JP	0.0000*	0.0002***	0.0000	0.0000*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
COFA	0.0001	0.0014***	0.0000	-0.0003
	(0.0000)	(0.0002)	(0.0001)	(0.0003)

Notes: All outcomes are counts of admissions per person/month that were charged to the individual. All other notes are per Tables 2 and 3.

Table 7: Fixed Effects DD Estimates: Effects on Infants

	Inpatient		ER		Inpatient Charges		ER Charges	
COFA	-0.0019***	-0.0029***	-0.0062***	-0.0075***	-45.68***	-71.41***	-15.19***	-17.01***
	(0.0002)	(0.0003)	(0.0006)	(0.0007)	(11.38)	(11.60)	(1.40)	(1.54)
COFA *		0.0605***		0.0736***		1554.37***		108.88***
Infant		(0.0035)		(0.0057)		(255.66)		(9.09)

Notes: All outcomes were reimbursed by Medicaid. The estimations were restricted to people under 65 years of age. All specifications correspond to those from Table 2 except that the odd columns include a dummy for being an infant and its interaction with the COFA/post variable. All other notes are per Table 2.

Figure 1: Utilization by Race

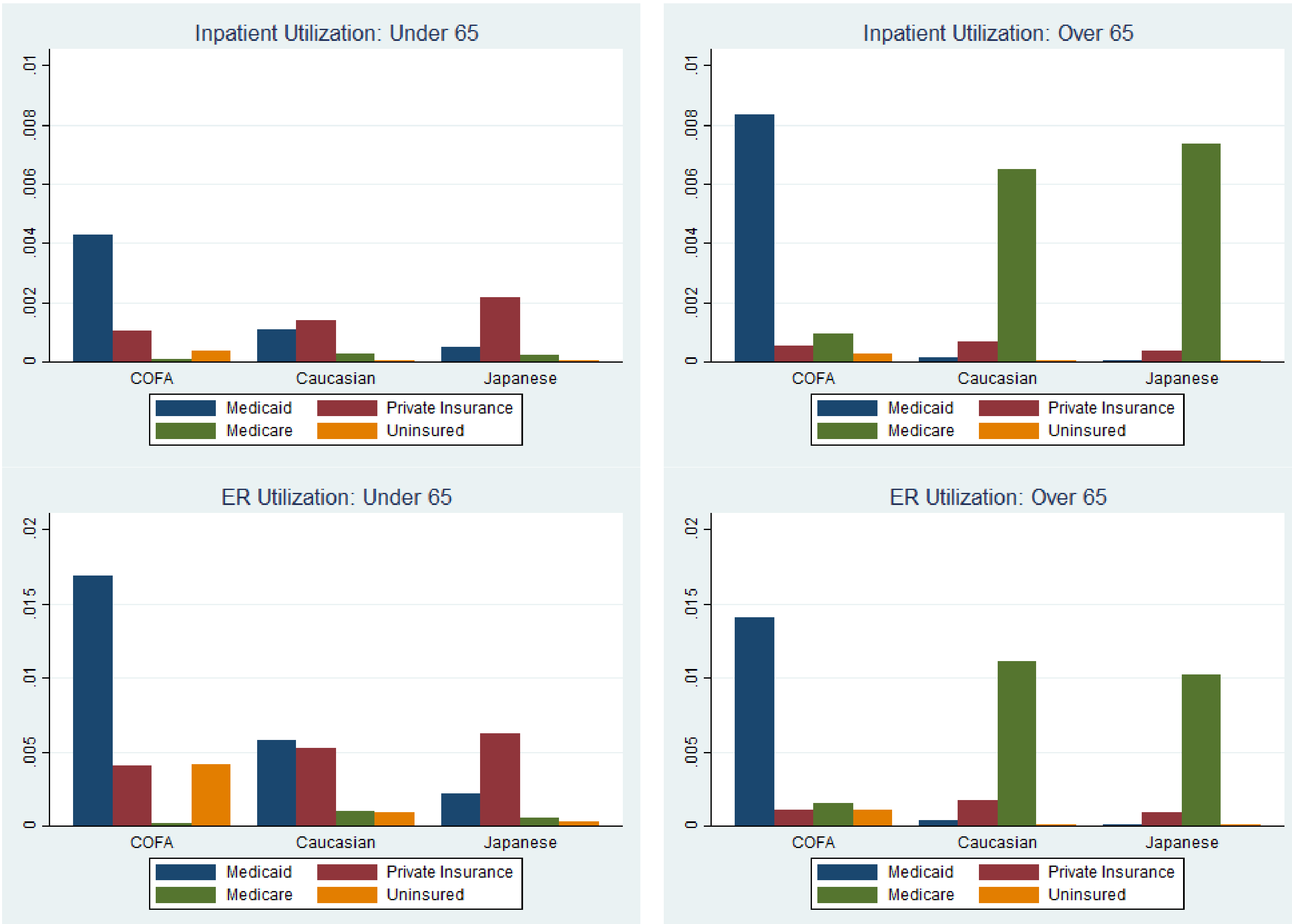

Figure 2: Event Analysis, Under 65

Figure 3: Effects by Age

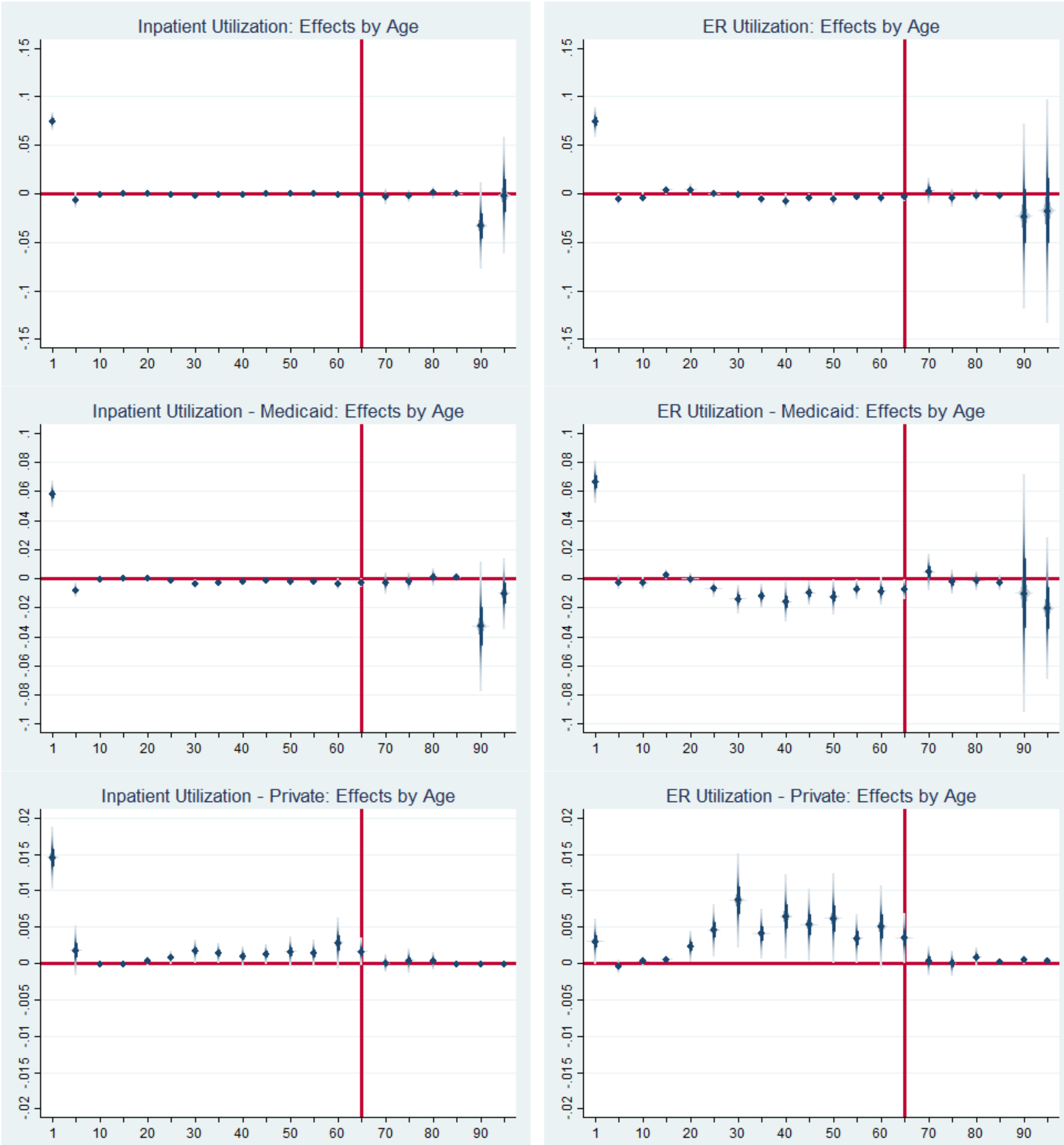

Figure 4a: Event Analysis, Under 65, Uninsured Utilization

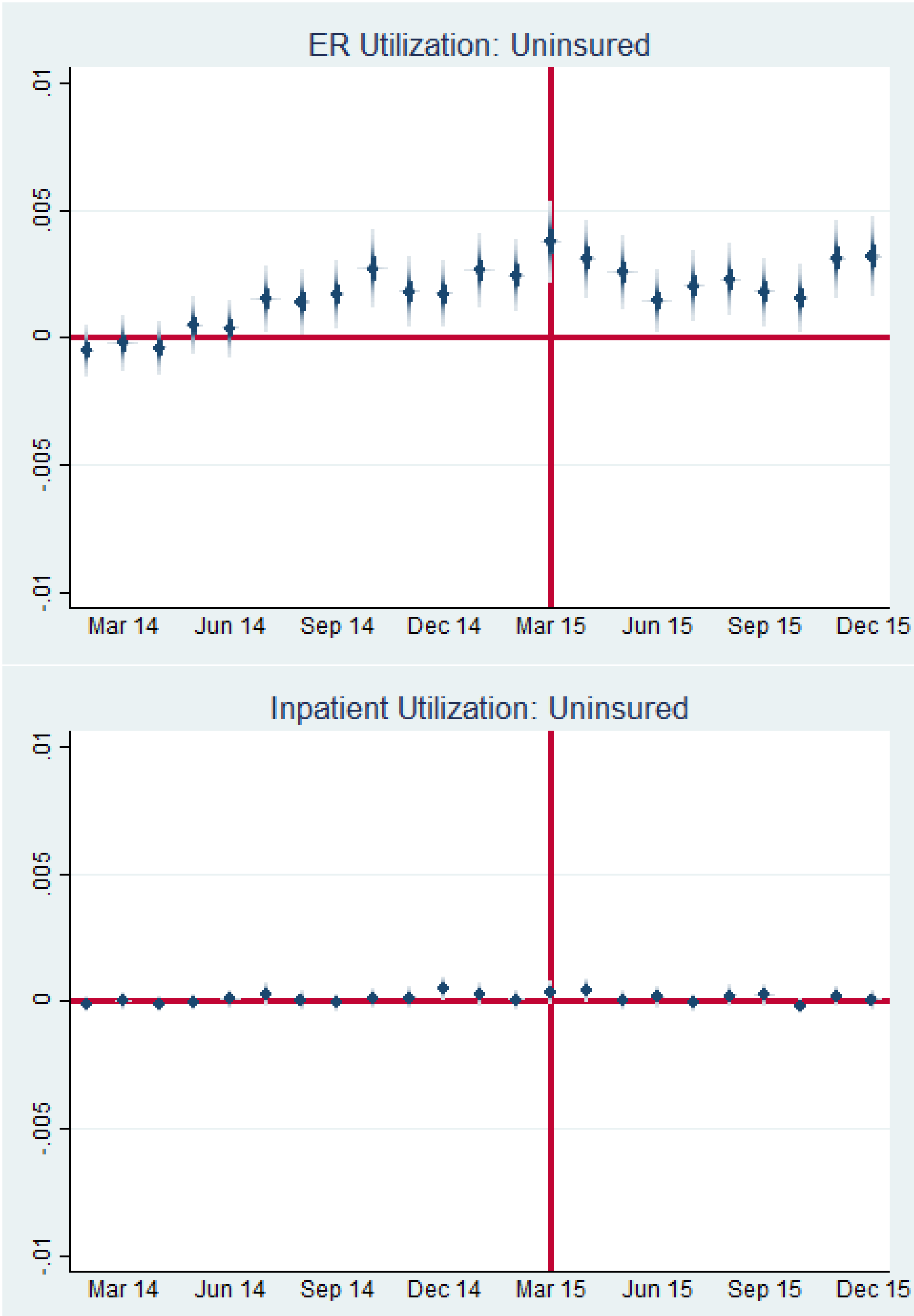

Figure 4b: Effects by Age, Uninsured Utilization

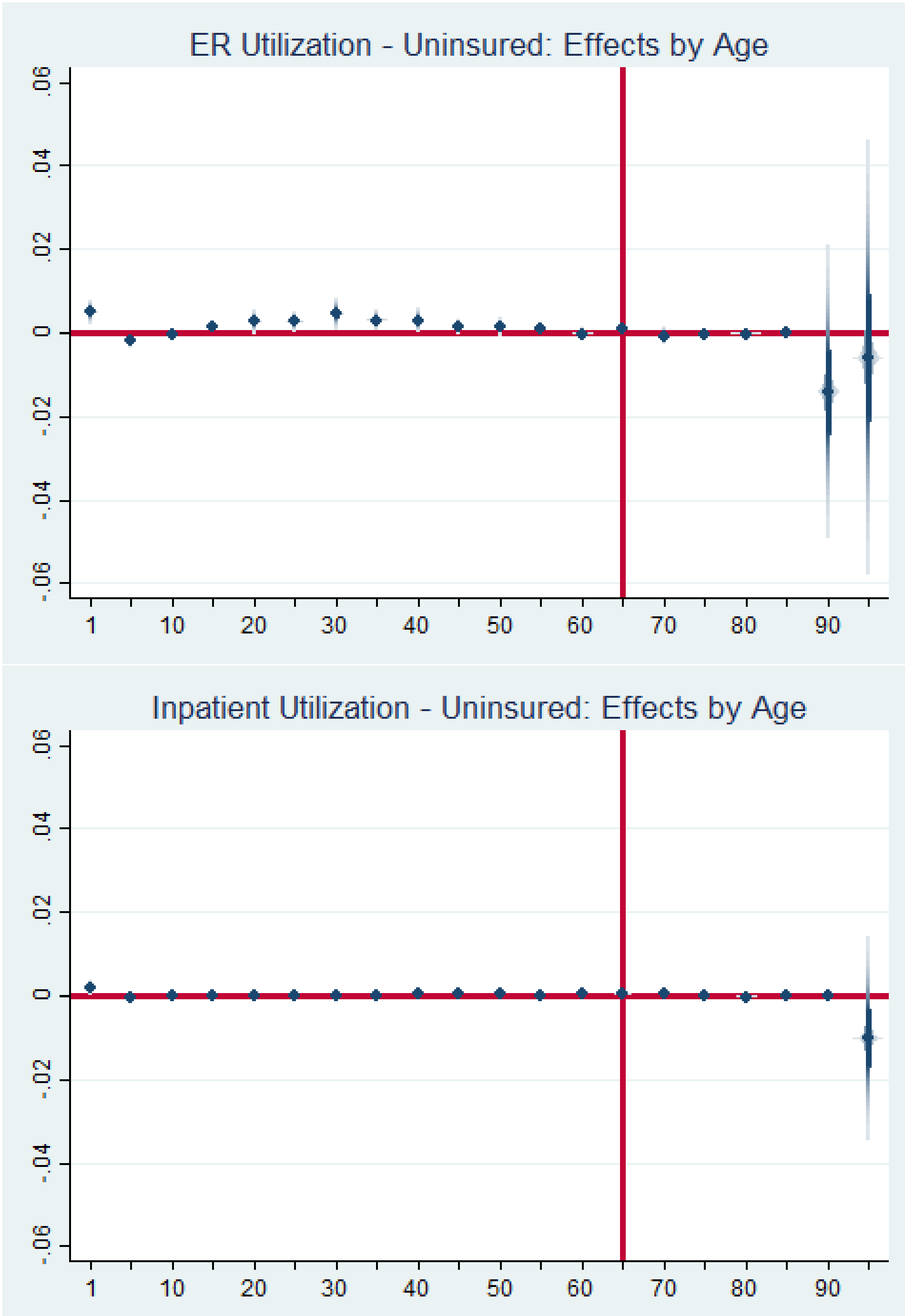

Figure A1: Effects by Age, Inpatient Utilization Funded by Medicaid
Excluding Infants