

**Report on the Impact of Cost Sharing in the
Healthy Michigan Plan
Healthy Michigan Plan Evaluation Domains V/VI**

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Executive Summary

The University of Michigan Institute for Healthcare Policy & Innovation (IHPI) is conducting the evaluation of the Healthy Michigan Plan (HMP) as required by the Centers for Medicare & Medicaid Services (CMS) through a contract with the Michigan Department of Health and Human Services (MDHHS). The focus of Domains V and VI is to evaluate the role of cost-sharing in the program with a focus on:

- 1) whether the cost-sharing structure, specifically the assessment of co-payments for certain medical services and monthly contributions, affects how much enrollees spend (Hypothesis 1)
- 2) whether the cost-sharing structure affects the services enrollees use (Hypothesis 2)
- 3) whether the cost-sharing structure affects enrollees' likelihood of disenrolling from the program (Hypothesis 3)
- 4) whether healthy behavior rewards are associated with more use of preventive care (Hypothesis 4).

Methods

Data

To find out how cost-sharing affected behavior, we focused on those enrollees who had experience with the cost-sharing features of the Healthy Michigan Plan (HMP). Cost-sharing begins after six months of continuous enrollment in an HMP managed care plan. We used enrollment data from the Michigan Department of Health and Human Services Data Warehouse to determine our study population and included enrollees who met the following criteria:

- First month of HMP managed care (MC) between April 2014 and March 2015 (1st year of HMP)
- HMP MC enrollment for at least 18 consecutive months
- Between 22 and 62 years old in 2014
- Not enrolled in a special program (e.g. nursing home care, hospice care)

We analyzed data from a 30-month period (April 2014-September 2016). Enrollees in other Medicaid programs for a portion of this 30 months were included if they met the criteria above. For some analyses, we used survey data as described in the body of the report.

Analysis

For all hypotheses, we completed statistical analyses of multivariate relationships between our outcomes (e.g. total spending, service use, disenrollment) and our key explanatory variables of interest, cost-sharing and income as a percent of the federal poverty level (FPL). We used linear and non-linear regression techniques that have been validated to provide accurate associations between variables and tested our results with alternative models. For hypotheses 1 and 2, we compared spending and use of preventive care and other services for three different income groups: 0-35% FPL, 36-99% FPL, 100+% FPL. Since many in the 0-35% group had no reported income, they were effectively exempt from cost-sharing. Those in the 36-99% category faced co-payments for services used but not monthly contributions, and those in the 100+% category faced both co-payments and monthly contributions. For hypothesis 3, we compared

disenrollment for those who had cost-sharing against those who did not, and especially focused on those close to 100% FPL. For hypothesis 4, we examined whether enrollees with a completed health risk assessment were more likely to use a preventive service.

Results

Demographic Characteristics

The population of 158,369 enrollees who met the selection criteria were:

- 55% female
- 64% white
- Likely to live in the Detroit Metro area (42%)
- Likely to have an income at 0-35% FPL (58%)

Cost-Sharing Characteristics

- Slightly more than half of the population (51%) had a cost-sharing obligation (either a co-pay or contribution that generated a non-zero statement)
- The average quarterly statement for those with an obligation was \$16.85 (\$11.11 for those below 100% FPL and \$30.93 for those at or above 100% FPL)
- Overall, about one quarter (23%) of all enrollees who owed anything paid in full, about half (48%) of those who owed money made no payments
- People above 100% of FPL were more likely to pay some or all of their statement than people below despite their higher average obligations
- After the first potential 6-month period of cost-sharing (months 7-12 of enrollment), rates of payment dropped. For those who paid at least once, an estimated 65% paid in full for months 7-12 and 56% paid in full for months 13-18.

Medical and Pharmaceutical Spending (Hypothesis 1)

Spending here is defined not just as the cost-sharing amount the enrollee is obligated to pay for the service, but as the total amount spent by both the health plan and the enrollee.

- Average monthly amount spent (April 2014-Sept 2016): \$360
- Median monthly spending: \$136
- Those with incomes 0-35% FPL spent more per month (\$391) than those with incomes 36-99% FPL (\$313) or 100+% FPL (\$327)
- Pharmaceutical spending increased for the entire HMP population with 18 months of continuous enrollment. That result is consistent with, and probably driven by, the initiation and maintenance of medications for chronic disease.
- Medical spending remained flat or declined for those with higher levels of cost-sharing, either from co-payments or monthly contributions. Though we cannot definitively attribute this change to cost-sharing attributes of HMP, these general patterns may indicate that those with monthly contributions may have become more efficient users of the healthcare system over time.

Service Use (Hypothesis 2)

- We use services exempt from co-payments (vs. services where co-payments are likely) as an indicator of which services the state deems high (vs. low) value. During the study period, 81% of enrollees received a co-pay exempt preventive service (exemption often based on care for a chronic condition per program rules). 56% received a service likely to have a co-payment and incurred a co-payment for it (vision exam, chiropractic treatment, new patient visit, office consultation). All income groups had similar rates of co-pay exempt and co-pay likely service use.
- Co-pay exempt preventive service use and co-pay likely service use declined over time.
- Use of the emergency department declined over time.

Disenrollment (Hypothesis 3)

- People with co-pay exempt chronic conditions are less likely to disenroll than those without. Among those with co-payments, those with the highest co-payments are less likely to disenroll.
- Enrollees just above 100% FPL have a higher rate of disenrollment than those just below it, which may be caused by monthly contributions. However, those with evidence of higher medical needs do not have higher disenrollment above 100% FPL, suggesting the plan retains clinically vulnerable populations regardless of cost sharing obligations.
- Among previously enrolled individuals, those with cost-sharing obligations and those who pay their obligations are more likely than those without obligations to gain insurance after disenrolling from HMP, underscoring that disenrollment does not always lead to uninsurance.
- In a survey of those no longer enrolled in Healthy Michigan, most enrollees said the amount they had to pay was fair and affordable. Among those with any cost obligations, 89% said they felt the amount they had to pay was fair and 95% said the amount they had to pay was affordable.

Healthy Behaviors (Hypothesis 4)

- People who have a recorded attestation for a completed Health Risk Assessment are much more likely than those who do not have an attestation to have a preventive visit (84% vs 50%), have a preventive screening (93% vs 71%), and use a co-pay exempt medication to control a chronic disease (66% vs 48%).

Conclusion

Overall, we found that cost-sharing requirements may reduce the amount spent by plans and enrollees on medical services, though we could not rule out other causes of the decline. Cost-sharing does not appear to affect the mix of high- and low-value services used in this population. Monthly contribution amounts may cause increased disenrollment from the plan among those with low medical spending and no chronic conditions but not among those with higher medical needs. While people who complete Health Risk Assessments are more likely to also complete healthy preventive behaviors, we could not determine if the health risk assessments themselves increased these behaviors or if they were both the result of a physician visit.

Introduction

The University of Michigan Institute for Healthcare Policy & Innovation (IHPI) is conducting an evaluation of the Healthy Michigan Plan (HMP) as required by the Centers for Medicare & Medicaid Services (CMS) through a contract with the Michigan Department of Health and Human Services (MDHHS). This report presents findings from Domains V and VI of the evaluation, which assesses the impact of monthly contribution requirements and the impact of cost-sharing implemented through the MI Health Account framework. As outlined in the CMS Special Terms and Conditions, the focus of Domains V and VI is to 1) assess whether the contribution requirements for certain enrollees affect propensity to retain insurance or use health care services and 2) evaluate whether features of the MI Health Accounts deter enrollees from receiving certain health care services and/or encourage enrollees to be more cost conscious.

Background on Cost Sharing in the Healthy Michigan Plan

One of the key market-based features of the Healthy Michigan Plan is the MI Health Account, which facilitates cost-sharing for HMP enrollees. Cost-sharing obligations are tracked and paid through the MI Health Accounts and enrollees receive a new statement, with a payment schedule as applicable, each quarter. While Medicaid programs have historically placed little emphasis on patient-directed financial incentives, MI Health Accounts aim to encourage enrollees to take more responsibility when it comes to their healthcare costs, and perhaps modify their behaviors to reduce costs.

Some co-payments are waived for State-defined services to treat and manage chronic conditions (e.g., diabetes) and for preventive care. Additionally, certain populations are exempt from all co-payments including those who are pregnant, enrollees under age 21, enrollees receiving nursing home or hospice care, Native Americans and Alaskan Natives eligible to receive services furnished by an Indian health care provider or through referral under contract health care services, and individuals who are enrolled in Children's Special Health Care Services (CSHCS). Enrollees with incomes above 100% of the federal poverty level (FPL) also pay monthly contributions into their accounts, up to 2% of their annual income. All enrollees have an opportunity to reduce their co-payments and monthly contributions through completion of a health risk assessment and attesting to a healthy behavior.

During the first six months of enrollment, no co-payments or monthly contributions are due. All cost-sharing obligations begin in the 7th month or later of enrollment in a managed care plan and are based on service use and income. MI Health Account statements are sent quarterly to enrollees with cost-sharing obligations and include a monthly contribution based on income (for those above 100% FPL) and co-payments based on utilization of services. Enrollees generally are expected to pay monthly (1/3 of the quarterly statement) though can pay all at once. Not all health services or medications include co-payments, so enrollees are not always responsible for utilization-based cost sharing each quarter even if they do use services. Additionally, cost-sharing amounts can be reduced by completing a health risk assessment, and these reductions are shown on the MI Health Account statement.

If an enrollee fails to pay his or her required co-payments and/or monthly contributions, after a six-month grace period, state law directs MDHHS to pursue certain penalties or avenues for collection (e.g. offsets of state tax refunds or state lottery winnings), though enrollees cannot be disenrolled from the program due to failure to comply with payment requirements.

These novel benefit designs represent some of the first efforts to implement financial incentives among Medicaid enrollees. On one hand, these incentives have the potential to yield more engaged enrollees who make more informed choices about their use of health care services and their health behaviors. On the other hand, higher cost-sharing among these low-income individuals may delay receipt of necessary care which could lead to adverse health consequences.

Domain V/VI Hypotheses

The hypotheses as outlined in the CMS Special Terms and Conditions:

Hypothesis V/VI.1:

Cost-sharing implemented through the MI Health Account framework will be associated with beneficiaries making more efficient use of health care services, as measured by total costs of care over time relative to their initial year of enrollment, and relative to trends in the Healthy Michigan Plan's population below 100% of the Federal Poverty Level that face similar service-specific cost-sharing requirements but not additional contributions towards the cost of their care.

Hypothesis V/VI.2:

Cost-sharing implemented through the MI Health Account framework will be associated with beneficiaries making more effective use of health care services relative to their initial year of enrollment, as indicated by a change in the mix of services from low-value (e.g., non-urgent emergency department visits, low priority office visits subject to co-payments) to higher-value categories (e.g., emergency-only emergency department visits, high priority office visits not subject to co-payments), and relative to trends in the Healthy Michigan Plan's population below 100% of the Federal Poverty Level that face similar service-specific cost-sharing requirements but not additional contributions towards the cost of their care. Several questions on the Healthy Michigan Voices Survey also address this hypothesis.

Hypothesis V/VI.3:

Cost-sharing and contributions implemented through the MI Health Account framework will not be associated with beneficiaries dropping their coverage through the Healthy Michigan Plan. Beneficiaries above 100% of FPL who have few health care needs may consider dropping coverage due to the required contributions. However, those contributions do not begin until 6 months after enrollment and can be reduced by 50% based on healthy behaviors. Therefore, we expect most beneficiaries will have little incentive to let their enrollment lapse, despite continued eligibility. To determine the prevalence of coverage drops due to cost-sharing, we will monitor compliance with contribution requirements and use the Healthy Michigan Voices survey to assess reasons for failure to re-enroll.

Hypothesis V/VI.4:

- A. Exemptions from cost-sharing for specified services for chronic illnesses and rewards implemented through the MI Health Account framework for completing a health risk assessment with a primary care provider and agreeing to behavior changes will be associated with beneficiaries increasing their healthy behaviors and their engagement with healthcare decision-making relative to their initial year of enrollment. Several questions on the Healthy Michigan Voices Survey also address this hypothesis.

- B. This increase in healthy behaviors and engagement will be associated with an improvement in enrollees' health status over time, as measured by changes in elements of their health risk assessments and changes in receipt of recommended preventive care (e.g., flu shots, cancer screening) and adherence to prescribed medications for chronic disease (e.g., asthma controller medications).

Methods

Below, we provide an overview of the methods and data sources that apply to testing the four specified hypotheses. Hypothesis-specific methods will be described later in the sub-sections devoted to each hypothesis.

Eligible Population

This report reflects a secondary analysis of administrative claims, cost sharing and enrollment data for Healthy Michigan Plan enrollees. The study population for hypotheses 1, 2, and 4 includes Medicaid enrollees ages 22-62 in 2014 who enrolled in a Healthy Michigan managed care plan between April 2014 and March 2015 and who were continuously enrolled for at least 18 months. We followed enrollees for up to 30 months if they remained continuously enrolled. We only measured periods during the 18 months or more of continuous enrollment, such that gaps in HMP enrollment were not allowed. Our study period included claims and cost-sharing information through September 2016. The 18-month eligibility requirement was selected to allow for an initial observation period of 6 months to serve as a baseline for health service utilization and spending prior to the receipt of the first MI Health Account statement, and a follow-up period of at least one year to allow measurement of utilization or spending changes. Enrollee eligibility months that include fee-for-service Medicaid, incarceration, and emergency services only are excluded (and thus do not count toward the 18-month eligibility criteria). To ensure that enrollees had not become Medicare eligible on the basis of age during our follow up period, we excluded enrollees younger than 22 in 2014, older than 64 in 2016 (62 in 2014), those in Children's Special Health Care Services, those in nursing homes, and those who ever received hospice services. Application of these criteria yielded an analytic population of 158,369 eligible enrollees; some analyses have slightly fewer enrollees due to missing variables. For portions of hypothesis 3, we relaxed the enrollment criteria, requiring at least 6 months of continuous enrollment rather than 18 as looking at changing behavior within the program was less relevant to the hypothesis. That population size is 469,465.

For additional analyses in hypotheses 3 and 4 we used samples who responded to two Healthy Michigan Voices surveys administered under Domain IV of the Healthy Michigan Plan evaluation. For hypothesis 3, which pertains to dropping coverage, we included respondents from the 2016-17 Healthy Michigan Voices survey of individuals no longer enrolled in the Healthy Michigan Plan who initially enrolled before March 2015 in order to match with our existing data. That sample includes 1,060 people. Analyses for hypothesis 4 include information from the 2016 Healthy Michigan Voices survey of current enrollees, which had a total of 4,090 respondents. We did not require continuous enrollment for these samples beyond that required to participate in the surveys.

Data Source

Administrative data were drawn from the MDHHS Data Warehouse. Data included Medicaid claims across service types (e.g., medical, pharmacy), program enrollment data, demographic

characteristics, health risk assessment completion and cost-share data. Claims related to substance abuse disorder were excluded from the dataset, consistent with MDHHS protocols, though enrollees with these claims were included, as was their non-substance abuse health care use. Data extraction was performed via a secure Virtual Private Network (VPN) connection by a data analyst with specific approval from MDHHS for this purpose, using existing protocols that require two layers of password protection. Data extraction is allowed under the authority of a Business Associates' Agreement between the University of Michigan and the MDHHS. Data processing, encryption and storage are done in accordance with a data security protocol approved by the MDHHS Compliance Office. Additionally, we used data from the 2016-17 Healthy Michigan Voices survey of individuals no longer enrolled in HMP and the 2016 Healthy Michigan Voices survey of current enrollees administered under Domain IV of the evaluation, as described above and in the methods section for each hypothesis.

Definitions

Demographic and Programmatic Characteristics: Demographic characteristics included age, gender, race, income level as a percent of FPL and MDHHS prosperity region. Age was evaluated in categories (under 30; 30 to 39; 40 to 49; over 50) based on birth year and held constant to reflect age in 2014. FPL was also evaluated in categories (0-35%; 36-99%; 100+ %) and allowed to change based on changes in FPL levels noted in enrollment data. Third-party liability (TPL) through concurrent public or private health insurance coverage was identified for each month of enrollment.

Spending: Spending measures are based on the total amount paid to health care providers for a service. Spending includes all medical care adjudicated through the claims process including outpatient visits, inpatient claims, emergency department visits, and pharmacy claims. It includes both the amount paid by the health plan, the state Medicaid program and, where applicable, the co-payment assessed to the enrollee. For most measures, medical spending for each enrollee was averaged at the monthly level.

Utilization-Based Measures: We used claims-based Current Procedural Terminology (CPT) codes to classify and define medical services and therapeutic class codes to define pharmaceuticals. We defined specific co-payment exempt services using state categories and specific lists of CPT codes defined by MDHHS. We defined co-pay likely services through claims-based analysis that allowed us to link CPT codes to co-payments. Specifically, we took a sample of claims from three non-contiguous months and measured which CPT codes were more often associated with co-payments. We then grouped these into service areas (e.g. vision exams, chiropractic services) and defined these groups as co-pay likely services. Co-pay likely medical services were those associated with a co-payment at least 50% of the time and the sample included at least 25 claims; co-pay likely medications were associated with a co-payment at least 40% of the time, with more than 3 claims.

Cost-sharing: Cost-sharing information comes from quarterly reports of enrollees' invoices and payments. The invoice amounts reflect the amount due and any reductions. We examined cost-sharing from the beginning of the program through the third quarter of 2016, combining monthly contribution and co-payment amounts to reflect the total amount that enrollees owe for each quarter, and applying the payment from that quarter to the amount due. For analysis over time, we calculated the fraction as the amount applied to each quarterly statement, divided by the total amount due.

For cross-sectional analyses, we calculated the total amounts owed and paid through the third quarter of 2016 and the fraction paid overall. We defined any fraction of 0.95 or above as full collection. Our calculated numbers represent the amount applied to an enrollees' account, which could differ from the amount paid in the case of overpayment. We coded any overpayments to reflect the full amount of the invoice owed and no more.

Co-payments: We identified co-payments through medical and pharmaceutical claims. The data do not reflect co-payments when they are waived for condition-based reasons, such as those waived for chronic diseases. However, the data may include co-payment amounts that are later waived or reduced for other reasons, including enrollees meeting their cost sharing limits or receiving reductions for Healthy Behavior rewards. Our analysis does not incorporate these later reductions.

Overall Analytic Plan for Testing Hypotheses

Domains V and VI use the implementation of cost sharing as a key independent variable to predict a number of outcomes. To provide context, we report descriptive statistics for the study population's demographic characteristics, as well as a characterization of the cost-sharing patterns (obligations and subsequent payments).

For hypotheses 1, 2 and 4, HMP enrollees' first 6 months in a health plan are compared against their later experiences, under the assumption that cost sharing implemented after the first 6 months of health plan enrollment may change behavior. We compare enrollees whose incomes are at 0-35 % of FPL and 36-99% of FPL, who are exempt from monthly contributions, to those above 100% of FPL, whose income and household size make them subject to monthly contributions. For hypothesis 3, we measured cost-sharing obligations and continued enrollment for those who are in an HMP managed care plan for at least 6 months continuously, excluding special populations mentioned above. We compared the obligations of those who disenroll from those who maintain enrollment for at least 6 to 12 more months.

Our statistical approach to all hypotheses uses multivariate regression models, either linear for continuous outcomes or discrete choice for binary outcomes. We use both fixed effects and repeated cross-sectional analysis to help evaluate the underlying dynamics of enrollee decisions. For outcomes in which data are skewed (i.e. spending outcomes), we use models that have been found less biased, including generalized linear models and transformations of the dependent variable. For a portion of the analysis for hypothesis 3, we use a regression discontinuity approach to measure disenrollment differences between those just above and just below the federal poverty line.

Results

Demographic Characteristics of Population

Sample characteristics are reported in Table 1, comparing the study population of enrollees continuously eligible for Healthy Michigan for at least 18 months (n=158,369) to shorter-term enrollees or those otherwise ineligible for inclusion in the analyses (n=411,169). Demographically, eligible enrollees were more likely to be older, female, and white compared to the ineligible population. The distribution of incomes and regions were quite similar across the two groups.

Table 1. Demographic Characteristics of Continuously Enrolled 18-30 Months in HMP Managed Care Plan vs. HMP Population Continuously Enrolled < 18 Months

	Continuously Enrolled in HMP Managed Care 18+ months (n=158,369)	HMP Population Enrolled in Managed Care for < 18 months (n=411,169)
Age		
Under 35	30.0%	46.2%
35-44	21.8%	22.3%
45-54	29.9%	20.2%
55-62	18.3%	11.3%
Female	54.5%	50.5%
Race		
White	64.0%	58.2%
Black	24.2%	24.4%
American Indian/Alaskan Native	0.5%	0.8%
Hispanic	2.8%	3.7%
Asian/Pacific Islander	0.5%	0.6%
Other	7.9 %	12.3%
FPL		
0%	51.1%	47.6%
1-35%	7.2%	8.4%
36-99%	25.7%	27.7%
100+%	15.9%	16.3%
Region		
Upper Peninsula	3.6%	2.7%
Northwest	2.6%	2.8%
Northeast	3.2%	2.4%
West	12.0%	13.2%
East Central	6.7%	5.9%
East	11.5%	10.3%
Southeast	6.8%	7.7%
South Central	4.1%	4.3%
Southwest	7.1%	8.1%
Detroit Metro	42.3%	42.3%

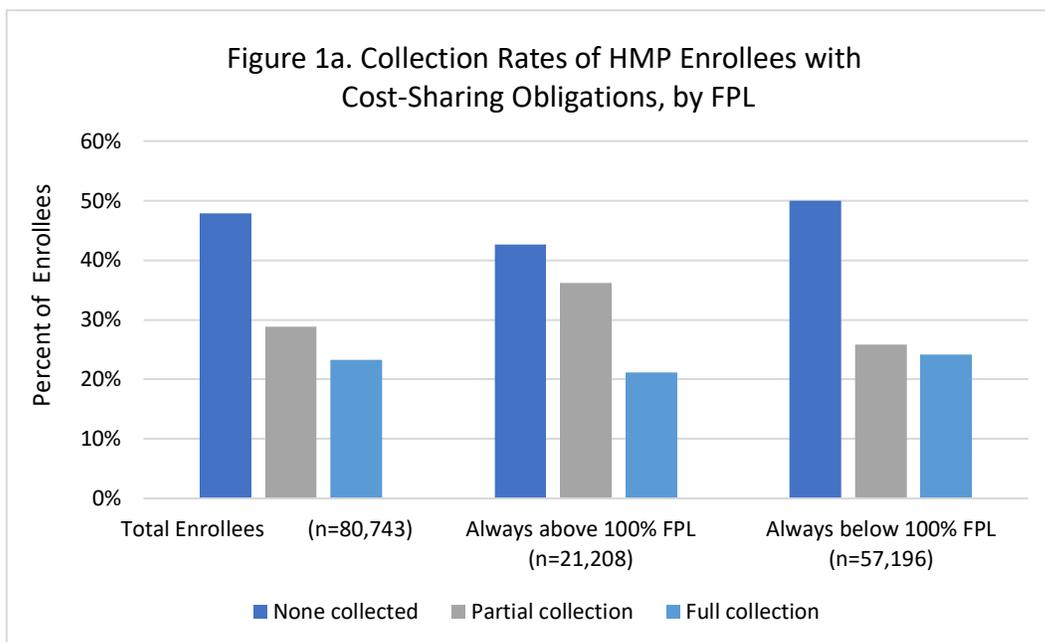
Notes: Enrollees under 22 or over 62 in 2014 were excluded from both groups. Special exclusion populations (CSHCS), nursing home residence, hospice care) dropped from both groups compared here.

Cost-Sharing: Average Invoice Amounts and Payment Behavior

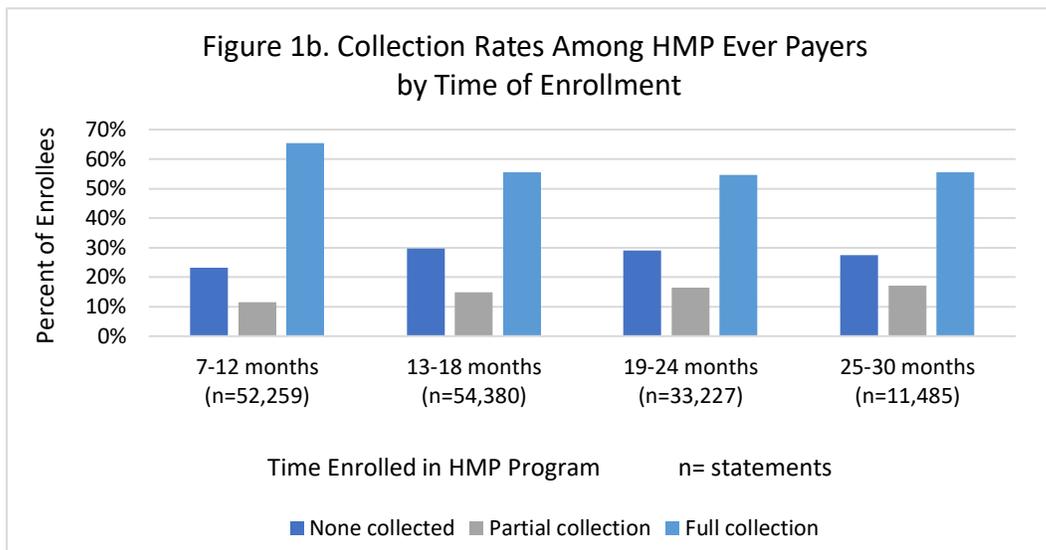
Average quarterly invoice amounts and payment status by FPL category are reported in Appendix Table 1.1. Slightly over half of those continuously enrolled for at least 18 months faced cost-sharing obligations. These obligations averaged \$8.59 per quarter in the entire analysis sample, and \$16.85 per quarter among those who actually faced obligations. Among those with obligations, payments

were collected from almost half of enrollees (Appendix Table 1.1a), with full payments being collected for about one fifth of enrollees. Enrollees with cost obligations who had an income above 100% FPL for the entire study period had a higher average quarterly invoice (\$30.93) than those with an income below 100% FPL with cost obligations (\$11.11).

Slightly less than half of enrollees with cost sharing obligations made no payments towards their obligation during the study period (Figure 1a). For those above 100% FPL, with substantially higher cost sharing obligations, rates of full payment were lower, though rates of partial payment were higher. Those with an income below 100% FPL were more likely to pay none of their obligation than those with higher incomes, despite having lower overall cost-sharing obligations. Results from an ordered logit model, adjusted for demographic characteristics (Table 1.2 in Appendix) confirmed these results, showing that those with higher incomes were more likely to pay some or all of their cost-sharing obligation.



Among enrollees who made at least one payment (n=42,098), collection rates by 6-month time period are illustrated in Figure 1b. When split out by period, most enrollees who made at least one payment, paid in full within the period. Full payment was most likely in the period of 7-12 months of enrollment (that is, the first two quarters when obligations could be assessed). After that, full collections decreased after the first year of enrollment and remained at about 55%. Likewise, partial and non-payment remained roughly steady at about 16% and 30%, respectively, after the first period. Appendix Table 1.4 reports the predicted percentage of payment type per time frame from the two regression models; one is unadjusted and the other controls for age, gender, FPL and region. After adjusting for these characteristics, the overall patterns remain similar to the unadjusted observations in Figure 1b. In particular, Appendix Table 1.5 shows the probability of paying in full, controlling for an individual’s initial payment behavior. Compared with the first period, an individual has lower likelihood of paying in full in later periods.



We examined the associations between cost-sharing amounts and perceived affordability or access barriers by linking cost-sharing data with 2016 HMV telephone survey data for 1,669 enrollees who had been enrolled in HMP for at least 18 months. We limited the cost-sharing data to the billed and collected premium contributions and co-payments in the 12 months prior to survey completion (sample characteristics in Appendix Table 1.8). We estimated the associations between cost-sharing amounts and perceived affordability and fairness of health care payments and delayed or foregone care in the previous 12 months. All models incorporated weights to adjust for probabilities of survey sampling and controlled for billed co-payments, age, gender, race/ethnicity, income, marital status, health status, and chronic conditions.

Compared to having no billed monthly contributions, we could not find associations between having moderate or high billed monthly contributions and enrollees being less likely to report health care payments as being affordable, less likely to report health care payments as being fair, or more likely to report delayed or foregone care due to cost (Appendix Table 1.9). Enrollees with higher cost-sharing obligations were more likely to pay at least some of what they were billed.

Hypothesis 1: Cost-Sharing and Total Cost of Care

Cost-sharing implemented through the MI Health Account framework will be associated with beneficiaries making more efficient use of health care services, as measured by total costs of care over time relative to their initial year of enrollment, and relative to trends in the Healthy Michigan Plan’s population below 100% of the Federal Poverty Level that face similar service-specific cost-sharing requirements but not additional contributions towards the cost of their care.

One objective of the cost-sharing implemented through the MI Health Account framework is to enhance the efficiency of the use of health care services by making enrollees partially responsible for the cost of care (cost-sharing for services actually received) and, for those over 100% of FPL, for part of the cost of participating in the program through income-related monthly contributions. As a proxy for efficiency of health care use, we track how the total monthly cost of care changes over time for 22-62 year olds continuously enrolled for at least 18 months and compare that across enrollees at different income (and hence monthly contribution) levels. Because cost-sharing is capped at a certain percentage of income, the expected amount of cost-sharing increases with increasing income. The

lowest income enrollees (0-35% of FPL) will face little cost sharing in absolute terms, both because they are exempt from monthly contributions and because total cost-sharing is capped as a percentage of income. Higher income enrollees (36%-99% of FPL) are at risk for greater cost-sharing, but still face no monthly contributions. Finally, the highest income group of enrollees (100% or more of FPL) will face both co-payments and monthly contributions.

An ideal evaluation design would compare spending before and after HMP enrollment among HMP enrollees and an otherwise similar set of Medicaid enrollees not subject to cost-sharing. Because pre-HMP health care costs are unavailable and groups categorically exempt from cost-sharing are quite different than HMP Medicaid expansion enrollees who are subject to cost sharing, we cannot directly make such comparisons. Therefore, we track spending among enrollees over their enrollment period to determine how their costs change and whether that change varies across income groups. One might expect the first year of costs to differ from subsequent years for several reasons. First, there might be pent up demand among those newly gaining coverage. That is, it is possible that first year spending is higher simply because people who were previously uninsured had been delaying care due to cost. Second, the delivery of information on cost as well as cost obligations through the MI Health Account framework could encourage individuals to make more efficient use of the healthcare system, again lowering costs of care. Since such learning could take time and enrollees do not receive their first MI Health Account statement until after six months of enrollment in a health plan, such effects may not be visible until the second year of enrollment. Lastly, since it may take time for enrollees to make and complete appointments, initial costs might be low for some period of time as new enrollees establish provider relationships.

Methods

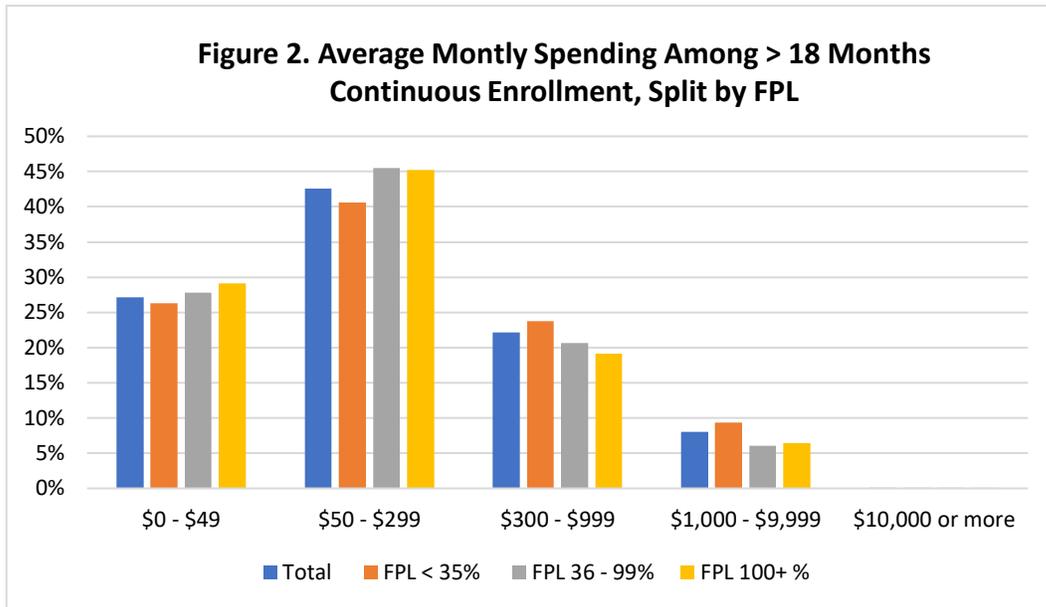
As described above, we captured all claims spending, including spending by managed care plans, and enrollee obligations. When comparing across income categories and time periods in regression analyses, we controlled for age, gender, region and the presence of other health insurance to reduce confounding by these demographic characteristics. As with most analyses of healthcare expenditures, the distribution of spending is highly right-skewed with a large number of enrollees spending a small amount, and a minority spending very large amounts during each period. Ordinary least squares regression, while the easiest to interpret, is known to produce biased results in these situations. Thus, we used a generalized linear model (GLM) to estimate and predict total spending for each time period and income category. These models produce more consistent and unbiased results with highly skewed outcome data.

All eligible enrollees are included in these analyses, regardless of whether they received a MI Health Account statement, as the objective was to test the effects of this design on the total spending of the eligible population.

Results

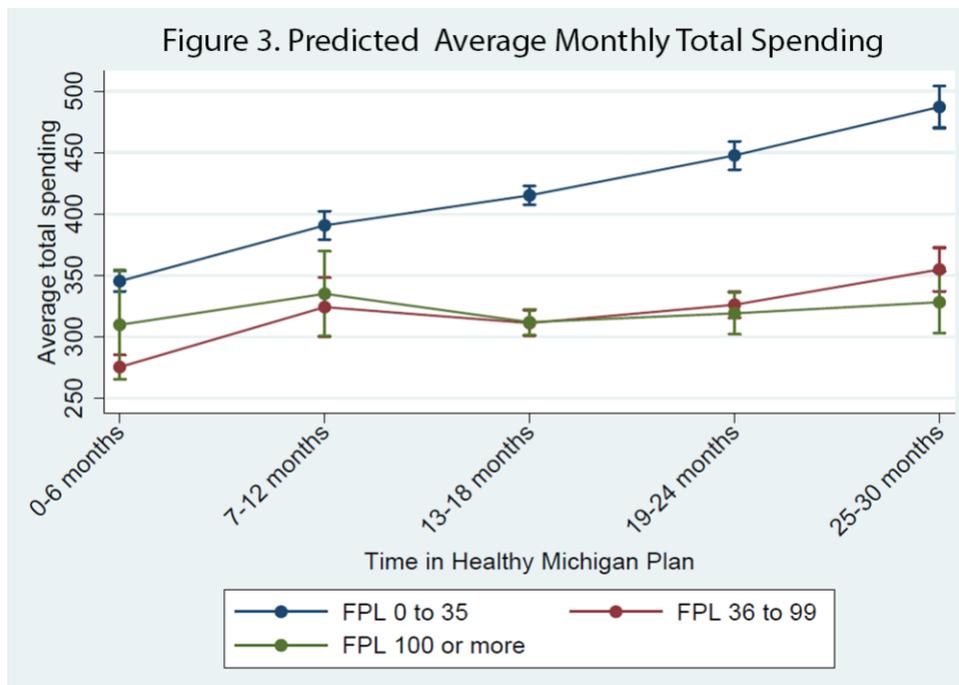
The distribution of average monthly spending by three income groupings (0-35% FPL, 36-99% FPL, and 100% or more of FPL) is shown in Figure 2. In each income category, the plurality of the population was in the \$50-\$299 monthly spending range. While the spending distribution did not

vary greatly across income groups, there was some trend towards lower income groups being slightly more likely to appear in the highest spending categories compared with the other income categories.

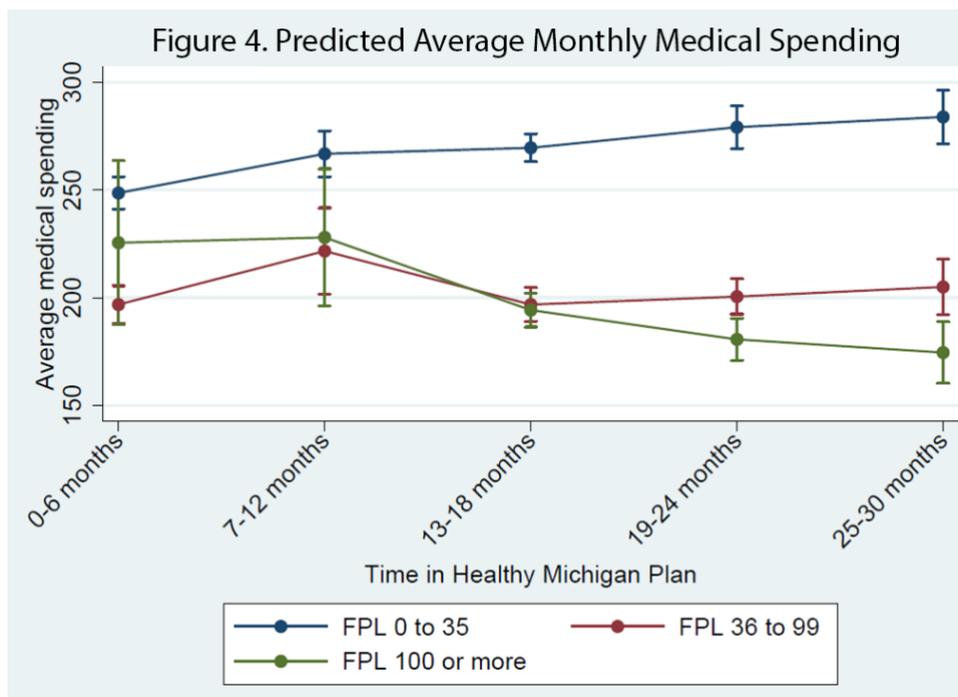


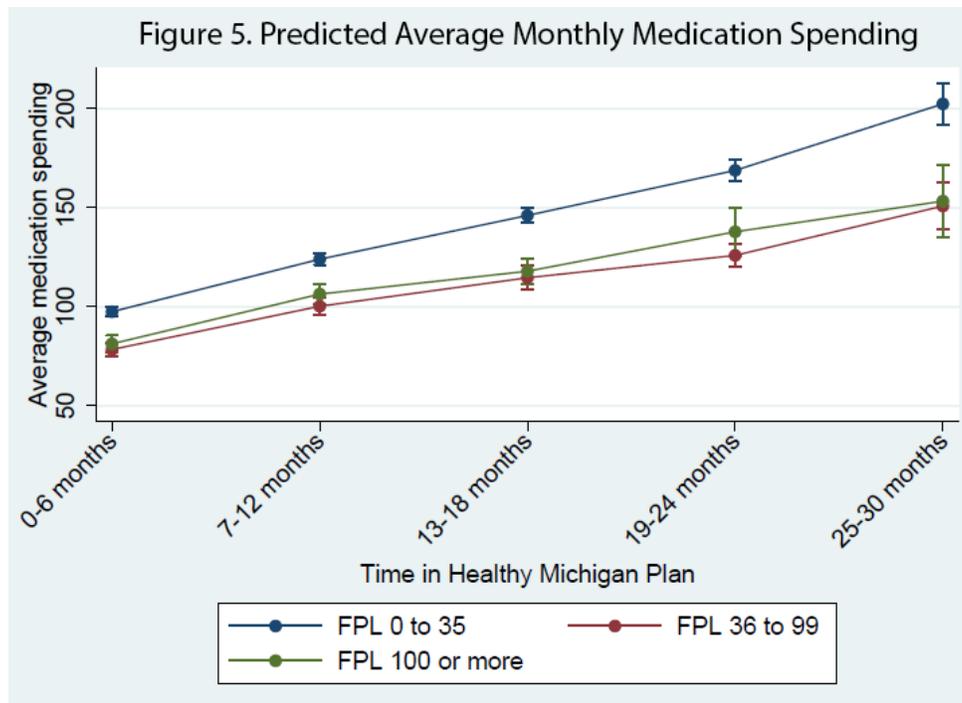
Overall, the average monthly amount spent was \$360.04 (Appendix Table 2.1). Broken into categories, \$238.44 was spent per month on medical services (including both inpatient and outpatient services) and \$121.60 was spent on medications in the 18-month continuously eligible population. Spending amounts varied slightly by income; amounts are shown in Appendix Table 2.1. The amount of spending per month changed over time, as shown in the following figures.

Figure 3 shows the predicted total monthly spending by period of enrollment and by income group, adjusting for demographic differences through the GLM regression model. These values represent the average predicted spending for persons in each income category in each six-month time period, controlling for all other characteristics in the model (age, race, gender, region, other insurance). The bars illustrate the 95% confidence intervals for each estimated average value. Overall, spending was highest in each time period for the 0-35% FPL group. Spending in the two higher income groups was very similar. In all three income groups, spending rose in the 7-12 month period relative to the 0-6 month period. After the 7-12 month period, spending continued to rise for the 0-35% of FPL group, but stabilized in the higher income groups.



Figures 4 and 5 break spending trends into medical services and pharmaceuticals. For medical spending, the highest income group generally shows declining monthly spending after the first two periods. The lowest income group shows increasing spending and the group of enrollees with incomes of 36-99% FPL shows statistically flat spending through the study period. For pharmaceutical spending, all income groups show increasing trends with the length of enrollment.





Overall, the results show fairly stable spending in the middle and higher income groups, and spending growth in the lowest income group. All income groups show spending growth in pharmaceutical spending. Medical spending, on the other hand, remains stable or declines in groups with higher cost-sharing requirements. We did not examine the reason for the growth in pharmaceutical spending, though it is consistent with the idea of adherence to medications once a prescription is initiated. While the interpretation of medical spending results remains speculative, it is consistent with the possibility that cost-sharing deters medical spending.

Due to the limitations regarding lack of a comparison group of similar new Medicaid enrollees who did not face cost-sharing and/or monthly contributions, these findings should be interpreted with caution. However, the general patterns, particularly for medical spending, may indicate that those with monthly contributions may have become more efficient users of the healthcare system over time.

Hypothesis 2: Cost-Sharing and Effectiveness of Services

Cost-sharing implemented through the MI Health Account framework will be associated with beneficiaries making more effective use of health care services relative to their initial year of enrollment, as indicated by a change in the mix of services from low-value (e.g., non-urgent emergency department visits, low priority office visits) to higher-value categories (e.g., emergency-only emergency department visits, high priority office visits), and relative to trends in the Healthy Michigan Plan’s population below 100% of the Federal Poverty Level that face similar service-specific cost-sharing requirements but not additional contributions towards the cost of their care. Several questions on the Healthy Michigan Voices Survey also address this hypothesis.

Among medical professionals and health policy scholars, recognition is growing that health care services offer a spectrum of clinical benefits that are dependent on the patient, the provider, and the service itself. This recognition has led to research that defines differences between high- and low-value medical services, and measures the cost, benefit, and prevalence of these services. Low-value care includes a range of potential waste in the system, including medical errors, variations in price unrelated to quality, services that are more likely to cause harm than benefit, and services that are used more often or in a wider population of patients than they should be. High-value care includes many preventive screenings and tests, medications, and services that attenuate the progression of chronic disease, and care delivery settings appropriate to the urgency and severity of the medical condition (See Table 2 for specific services). Through insurance benefit design and other measures, policymakers and payers have begun to encourage delivery of services that provide high clinical value, while discouraging medical services that provide little to no value.

The Healthy Michigan Plan was crafted in this policy environment. When state policymakers designed the provisions of the Healthy Michigan Program, they sought a federal waiver in part to include more cost sharing than in other state Medicaid plans or, historically, in Michigan's own Medicaid program. The waiver allowed for cost sharing for the overall cost of the plan (similar to premiums in the commercial market) as well as common medical services, including physician office visits, dental visits, medications, and outpatient hospital clinic visits. Policymakers also sought to encourage enrollees to engage in healthy behaviors. Thus, many services considered beneficial to long-term health, such as high-value primary preventive screenings and services or medications related to specific chronic diseases, were exempted from co-payments. It was expected that these exemptions would signal to enrollees that these services were valuable and encourage their use.

In practice, the structure of the program means that cost-sharing is not consistently applied to all services across the population. There are some enrollees who are exempted from all co-payments as a class some enrollees who may be exempted for a certain portion of time, (e.g. those exempted for the rest of the year once they have paid 5% of their income). Additionally, certain services such as preventive care, radiologic imaging and laboratory tests are nearly always exempted from co-payments. That means that some services researchers typically use as a signal of low-value or wasteful care—unnecessary imaging for low-back pain or headache, for example—are not applicable in this context. It also means that there are rarely services for which a co-payment would always be assessed. Once those groups that are never subject to cost sharing are excluded, there may still be exemptions for reasons such as maximum out-of-pocket limits or because a visit was related to a chronic condition. However, there are certain services that are more likely to incur co-payments such as chiropractic care, vision services and hospital-associated urgent care (type B) visits.

There are also certain high-value services that are nearly always co-payment exempt, such as preventive services and medications for specific chronic diseases. These are services that designers of the Healthy Michigan Plan singled out as worthy of encouragement. Our hypothesis is that use of these services will rise relative to those that are more likely to incur a co-payment, and relative to the initial year of enrollment, as enrollees learn about the value of the service through financial incentives.

Methods

Co-payment exempt services selected for this analysis include a subset of those exempted from co-payments through HMP. We chose to examine preventive screenings and care, which applied to a large number of enrollees in our population. As described above, we defined co-pay likely services as those associated with co-payments at least 50% of the time for medical services and 40% or more for medications. Table 2 includes a full list of each service or medication. For the co-pay likely measure, we flagged any six-month period in which an enrollee had used at least one of these services and incurred at least one co-payment for that service. Similarly, for emergency department (ED) visits, we flagged ED claims and measured the proportion of the population with an ED visit in each time period.

It is important to note that most services used do not fall into either of these categories, and thus analysis of service use along these categories should not be taken as an indication of total service use.

Service Type	Co-Pay Exempt	Co-Pay Likely
Visits	Well physical exam, preventive office visit, health risk assessment administration, preventive counseling, smoking/tobacco cessation counseling	Vision exams, contact lens visit, chiropractic treatment, new patient visit, office consultation
Screenings	Depression, BRCA testing, mammography, cervical cancer screen, sexually transmitted infections, cholesterol, colorectal cancer, diabetes, Hepatitis B/C, HIV, lung cancer, tuberculosis	
Medication Classes	Cardiovascular, COPD, diabetes, HIV, obesity, smoking	Metabolic deficiency, Hepatitis C, narcolepsy, hypnotics, cortisol, atypical antipsychotics, antineoplastic enzyme inhibitors, ADHD, ARV Comb-NRTIS and integrase inhibitor (infectious disease agent), Parkinson’s disease, ammonia inhibitors, Mek 1 and Mek 2 inhibitors, Gaucher’s disease,
Emergency Services	Emergency services	Non-urgent ED use

Notes: Co-pay exempt services were selected based on MDHHS definitions of co-pay exempt services which is available on the MDHHS website. Co-pay likely services were selected by looking at a sample of claims and measuring which services/medications were more likely to incur co-payments. Co-pay exempt and co-pay likely services were defined using claims prior to 2017; these classes may not be valid for later data periods, when the number of co-pay exempt services and medications list was expanded.

We compared use from year to year with the model specified below:

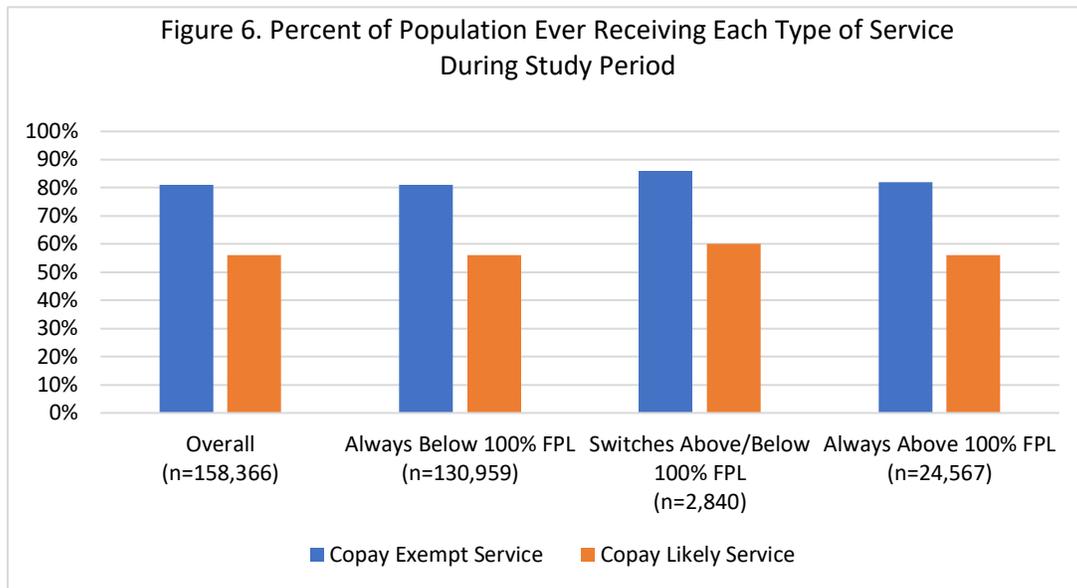
$$\Pr(Y_{it} = 1) = f(\beta_1 TimePeriod + \beta_2 FPL + \beta_3 Female + \beta_4 Age + \beta_5 GeographicRegion + \beta_6 Race + \beta_7 PaymentObligation + (\beta_8 \%OOPPaid) + \alpha_i + \varepsilon_{it})$$

In this model, the dependent variable Y_{it} is an indicator for whether a person has received a co-pay exempt/co-pay likely service. Percent out-of-pocket (OOP) paid is only available for the subset with a cost sharing obligation, approximately 50% of the sample. We include other specifications as well,

such as FPL interacted with year. Our primary specification is a probit regression, though we also use a fixed-effects linear regression to measure individual change over time.

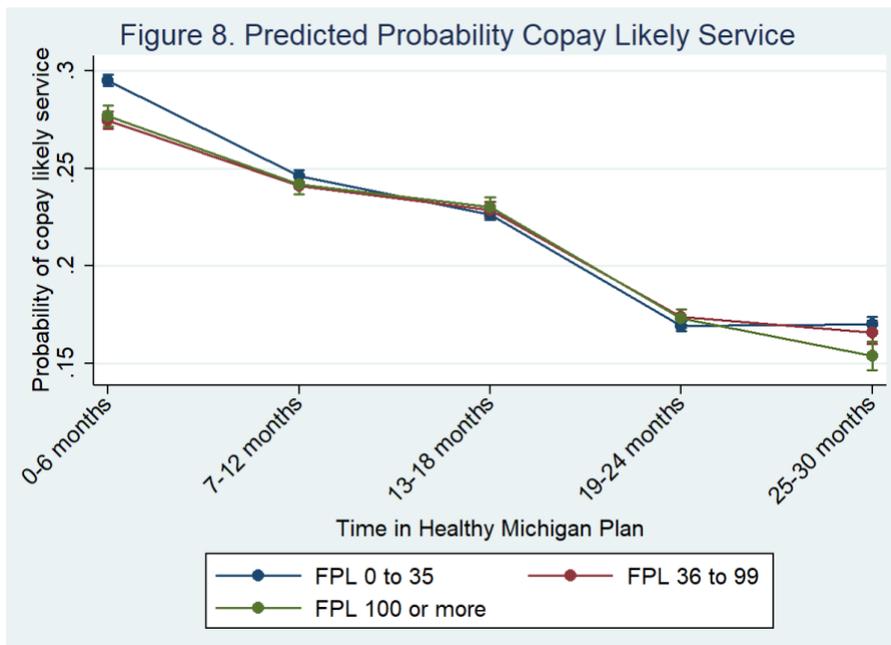
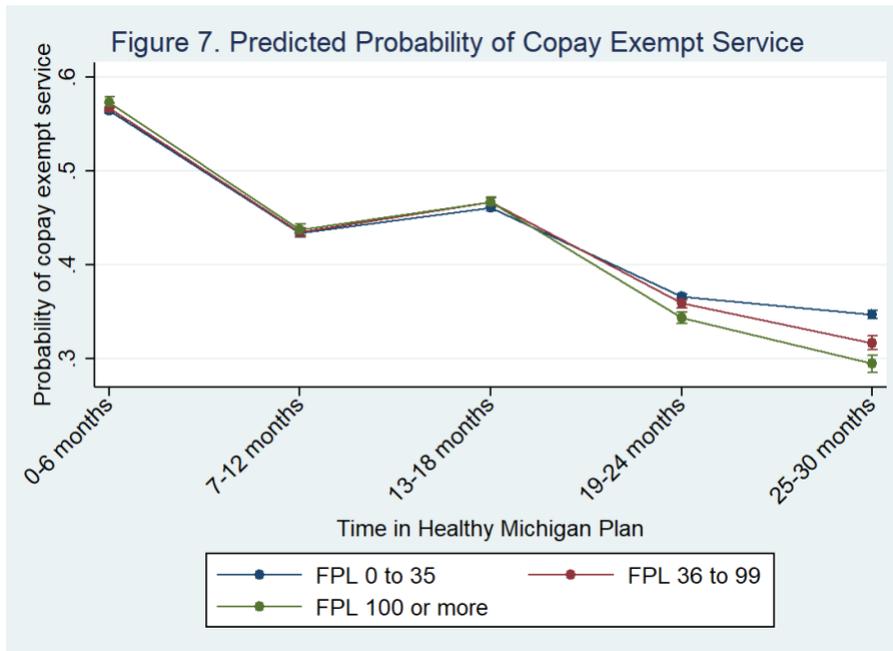
Results

The analyses focus on three types of services: a variety of general medical services with and without co-payments, pharmaceuticals, and ED use. Figure 6 shows the percent of enrollees who ever received a co-pay exempt or co-pay likely medical service by FPL. Overall, 81% received one or more co-pay exempt medical services while 56% received at least one of the specified co-pay likely services. These percentages did not vary substantially across the three income groups.



Predicted use of co-pay exempt and co-pay likely medical services by enrollee characteristics is reported in Appendix Table 3.1.1 Males and younger enrollees had fewer HMP claims for co-pay exempt and co-pay likely services. There were no consistent patterns in use of co-pay exempt services by income category, though those in the lower income group had a slightly higher usage of co-pay likely services than those in the 36-99% FPL and 100+% FPL groups.

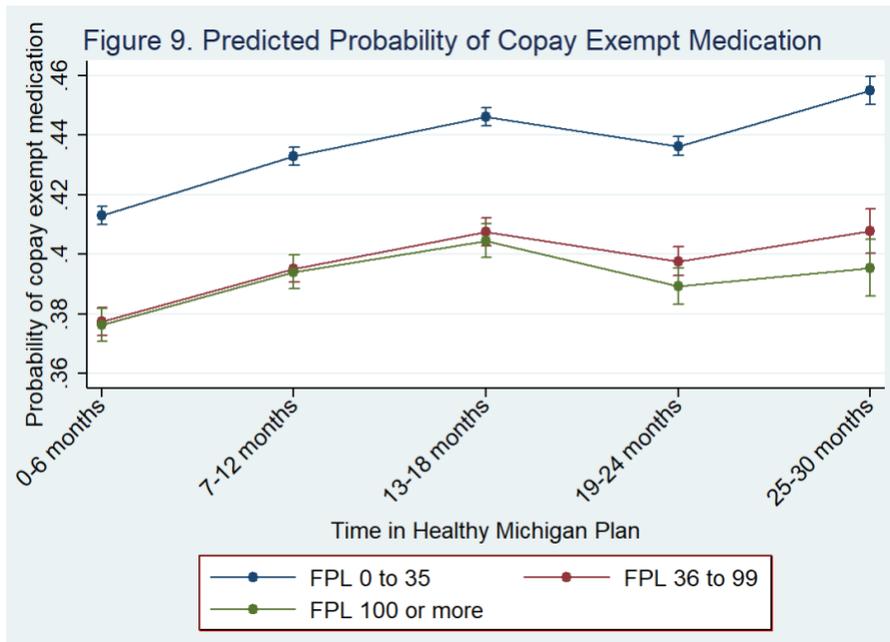
Looking at use of services over time, Figures 7 and 8 illustrate predicted use of co-pay exempt and co-pay likely medical services, respectively, for the eligible population at each time enrolled in HMP by income category, adjusting for all other characteristics in the model. These figures show both types of use declined in a similar fashion as enrollees had been in the program for a longer period of time.



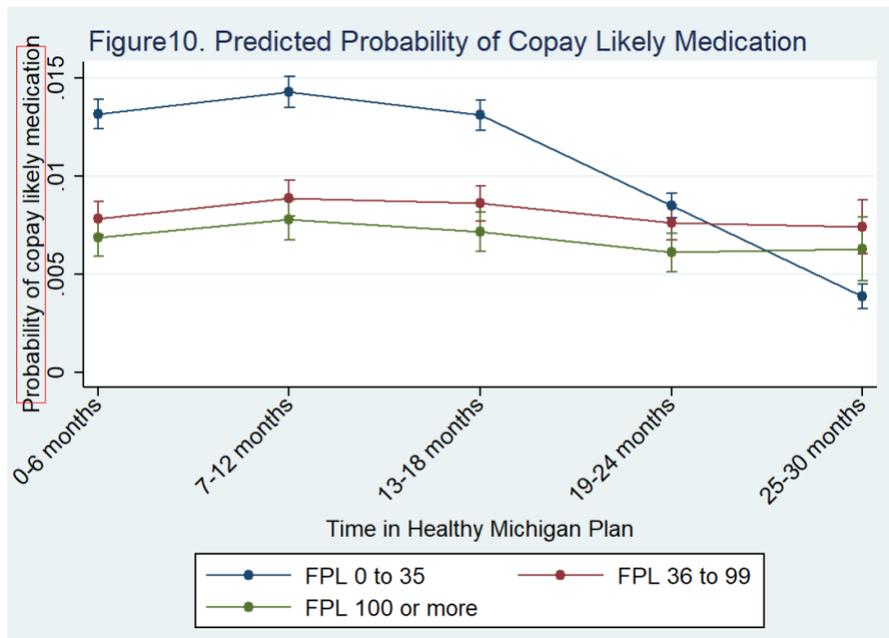
Similar analyses of co-pay exempt and co-pay likely prescription drugs show about half of enrollees received at least one co-pay exempt medication while only a small percent received a co-pay likely medication (reflecting the relatively small number of medications identified in that category). The likelihood of receiving a co-pay exempt medication varied only modestly with most enrollee characteristics (Appendix Table 3.2.1). Most notably, the percentage declined somewhat with income and rose substantially with age. Percent receiving a co-pay likely medication also varied only modestly with enrollee characteristics.

Looking over time, the use of co-pay exempt medications rose steadily with time enrolled in the program, starting at 40% in the first six months and ending at 43% in months 25-30 of eligibility as shown in Appendix Table 3.2.2. A slight decline was observed in the use of co-pay likely medications. Examining the trends separately by income level over enrollment time demonstrates that the use of

co-pay exempt medications was highest in the 0-35% FPL group and the increases in use with time enrolled were relatively consistent across all income groups (Figure 9).



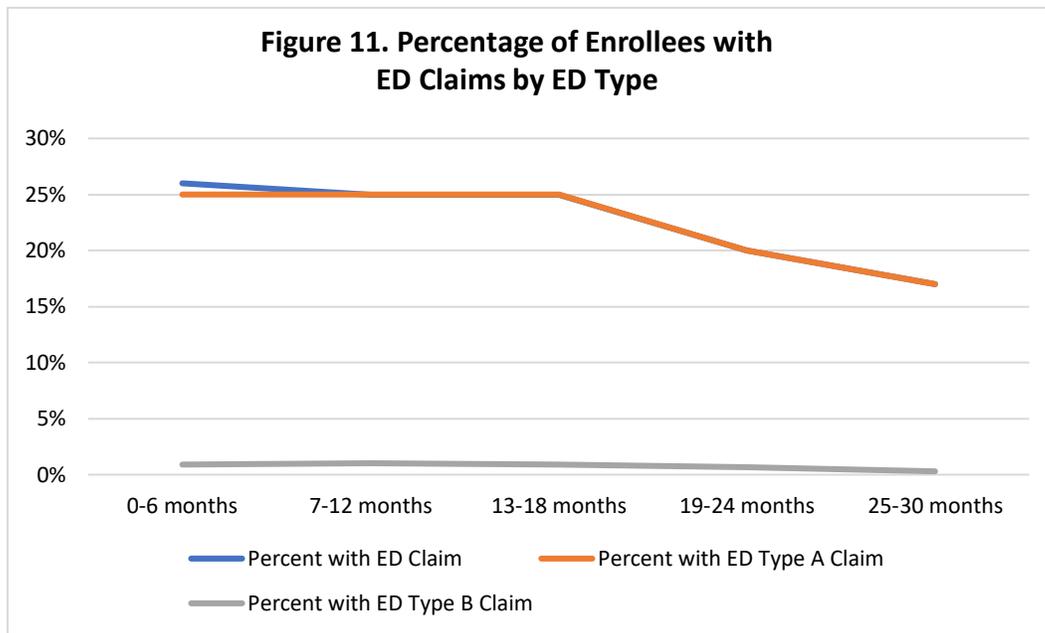
Only a small percentage of the population used a pharmaceutical for which a co-payment was regularly assessed (<3.0% in all income groups combined across all time periods; Appendix Table 3.2.1). For drugs that were identified as co-pay likely use was also highest in the 0-35% FPL group initially, but that group’s use declined beyond 18 months of enrollment (Figure 10).



Finally, we consider co-payments for ED visits. The type of ED used can be examined using CPT codes, which are different depending on location of care. Visits associated with a hospital-based urgent care facility are often assessed a co-payment (23% of visits). By contrast, visits associated with a traditional emergency room are almost never assessed a co-payment (0.05% of visits) (Appendix Table 3.3.1). The fraction with a co-payment also decreased with increased visit severity (Appendix Table 3.3.1),

though hospital-based urgent care facility visits incurred co-payments more often for each level of severity.

Figure 11 shows a reduction in the percentage of the population using the ED from initial months of continuous enrollment over subsequent months. That reduction is confirmed in the regression model adjusting for other enrollee characteristics (Appendix Table 3.3.3). This overall trend was driven primarily by the Type A visits, which rarely assessed co-payments, but was also evident in the Type B visits that were more likely to result in a co-payment. Adjusting for all other characteristics in the model, average severity of ED visits rose substantially after 18 months of enrollment (Appendix Figure 3.3.2), which could imply that less severe illnesses were being seen in other settings.



Overall, the findings provide some evidence that the mix of pharmaceuticals used improved in terms of value the longer that individuals had been enrolled in HMP. For pharmaceuticals, use of co-pay exempt medications rose over time in all income groups, while the use of co-pay likely medications either remained stable or declined. The picture is less clear for co-pay exempt and co-pay likely medical services, where use declined by comparable amounts for both types of services, keeping the mix approximately constant. Finally, ED use of all types declined with time enrolled.

While the value mix of services, at least in terms of pharmaceuticals, improved as enrollees had longer tenure in the program, it is uncertain how much out-of-pocket cost contributed to these changes. Notably, the trends in the use of co-pay exempt medications were quite similar across income groups facing different exposure to monthly contributions. Similarly, most of the decline in ED use occurred in type A visits where co-payments were rarely assessed; however, we did not assess to what extent enrollees were aware of the lack of co-payments for type A visits.

There are other reasons that these findings should only be interpreted as suggestive. In addition to the concern about lack of a comparison group, the process of classifying services should be kept in mind. We measured a subset of co-pay exempt services defined by the program. Co-pay likely services were a group of services for which enrollees often incurred a co-payment; we measured the likelihood of using and incurring a co-payment for at least one of this group of services per period.

The findings could change if we had measured different bundles of services or operationalized our definitions of co-pay likely in a different way. Additionally, the results for co-pay likely pharmaceuticals should be interpreted with caution, as the number of these medications was very low.

Hypothesis 3: Disenrollment Associated with Cost-Sharing

Cost-sharing and contributions implemented through the MI Health Account framework will not be associated with beneficiaries dropping their coverage through the Healthy Michigan Plan. Beneficiaries above 100% of FPL who have few health care needs may consider dropping coverage due to the required contributions. However, those contributions do not begin until 6 months after enrollment and can be reduced by 50% based on healthy behaviors. Therefore, we expect most beneficiaries will have little incentive to let their enrollment lapse, despite continued eligibility. To determine the prevalence of coverage drops due to cost-sharing, we will monitor compliance with contribution requirements and use the Healthy Michigan Voices survey to assess reasons for failure to re-enroll.

Enrollees below 100% FPL only face cost-sharing for services actually received and therefore are expected to have little reason to let coverage lapse due to cost. However, enrollees above 100% FPL who have few health care needs may consider dropping coverage due to the required monthly contributions. Because those monthly contributions do not begin until 6 months after enrollment in a health plan and can be reduced by 50% by completing an HRA and choosing to engage in a healthy behavior, we expect most enrollees who remain eligible will have little incentive to let their enrollment lapse. To test these hypotheses, we assess the extent to which total cost-sharing obligations (co-payments for services and monthly contributions) are related to disenrollment from HMP in two ways. First, we examine enrollees' perceptions of the fairness and affordability of cost-sharing under HMP and by insurance status after disenrollment from HMP. If cost-sharing strongly influences disenrollment, we would expect to see a substantial of disenrollees becoming uninsured after leaving the HMP program. The assumption is that those who gain insurance left because of improved circumstances (e.g., accepting a job that offers insurance), while those who left HMP but did not obtain other coverage are more likely to have disenrolled for other reasons including dissatisfaction. Second, we examine disenrollment from the program in the population enrolled for at least 6 months. Here, we can assess likelihood of disenrollment by cost-sharing obligations but cannot observe whether enrollees left and gained other insurance or left for other reasons.

Methods

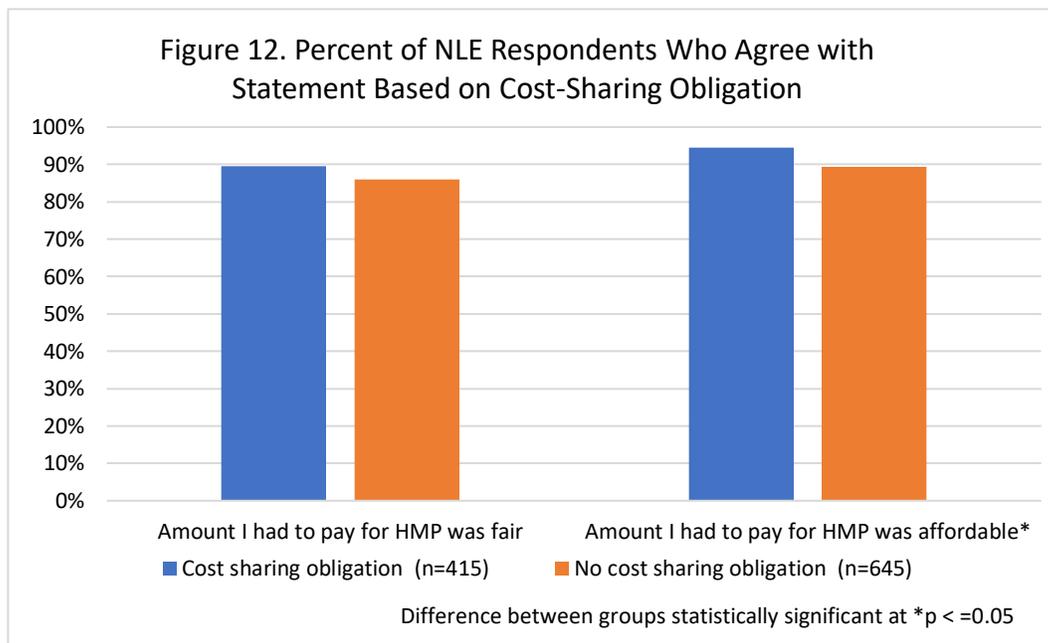
First, to determine the role of cost-sharing in disenrollment, we use the No Longer Enrolled (NLE) survey to assess reasons for failure to re-enroll. The NLE survey sample is drawn from enrollees who had at least 10 months of HMP enrollment followed by a period of at least 6 months (range 6-20 months) during which they were not enrolled in HMP or another Medicaid program. Survey questions explored enrollees' experiences during the period after their HMP coverage ended, including health insurance coverage, access to health services, and unmet health care needs. Surveys were conducted with 1,123 individuals who were no longer enrolled in HMP; our sample of 1,060 includes those enrolled before March 2015 who we could therefore link to our cost sharing data. We link the NLE data on reported insurance type since HMP ended to information on respondents' average cost-sharing levels and other characteristics while they were enrolled and to respondents' report of all health insurance during the 6-20 months from the time their HMP coverage ended to the time of the

NLE survey. Specifically, we compare respondents who reported no insurance coverage post-HMP (on the assumption they found no insurance preferable to HMP) to those who reported other health insurance (employer-sponsored, individual and/or government-sponsored) at some point after their HMP coverage ended.

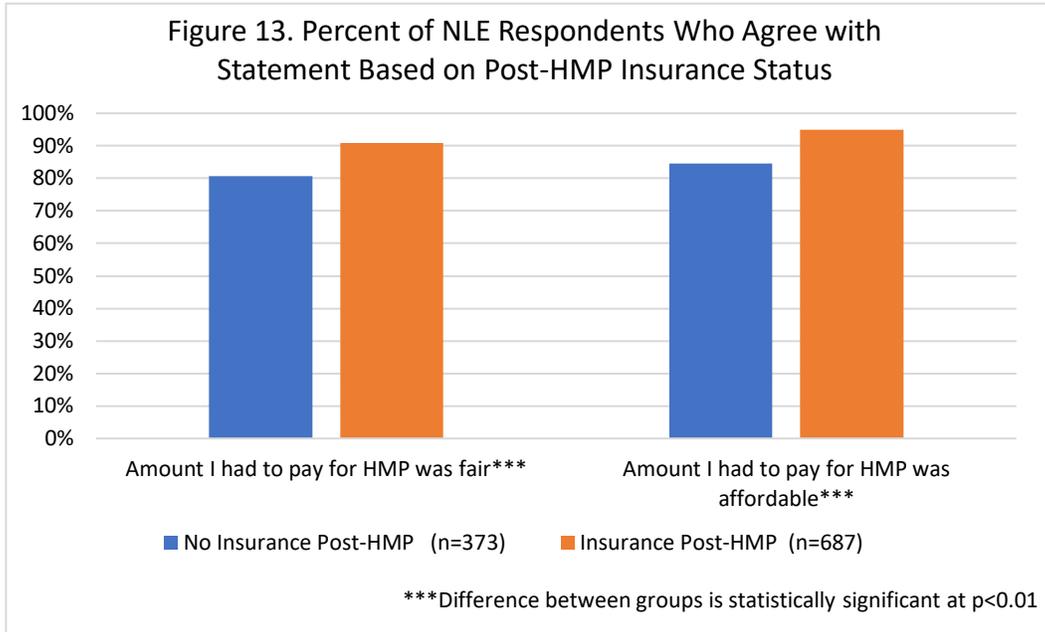
Additionally, we supplemented this analysis with two analyses of the full population of HMP enrollees to determine if cost sharing obligations were associated with a greater likelihood of disenrollment. Here, we used the population enrolled in an HMP managed care plan for at least 6 months continuously, who were not part of a special population (e.g. nursing home, hospice care, etc.; N=448,372 enrollees). We measured disenrollment as a drop from any Michigan Medicaid program, without reenrollment within 6 months. We merged enrollment data with quarterly cost sharing tables to measure contribution and co-payment amounts on the MI Health Account statement. We used statement date and amount owed on the MI Health Account statements, and examined whether the contribution, co-payment and total amounts predicted disenrollment within the next 11-month period. Second, to account for higher churn at the upper end of the eligible income spectrum, we measured disenrollment within 13 months of initial managed care enrollment for those just above and just below 100% FPL. We used enrollees in a managed care plan for more than 6 months continuously with an average income of 85% to 115% FPL (n=56,578 for this subpopulation; full population characteristics in Appendix Table 4.6 and Appendix Table 4.7). The assumption is that those individuals are relatively similar aside from the small difference in income, so if there is a jump in disenrollment near 100% FPL, it is more likely related to the contribution requirement triggered by exceeding that threshold. We analyzed these enrollees overall, and by subgroup based on medical spending and chronic disease claims.

Results

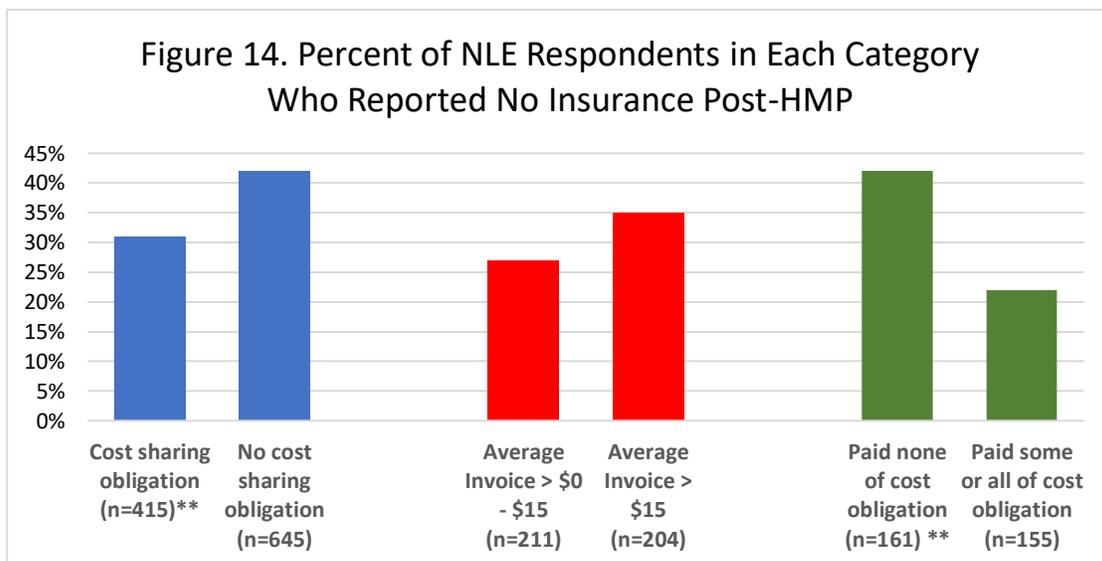
Figure 12 shows the percentages of NLE survey respondents who agreed that HMP’s cost-sharing obligations were fair and affordable. Agreement was quite high, with 89% of those who faced obligations agreeing that they were fair and 95% agreeing that they were affordable.



Agreement, while still high, was slightly lower among NLE survey respondents who didn't actually face an obligation. We did not test an explanation for this somewhat paradoxical result, though a possible reason could be payment for services not covered through HMP, such as for over-the-counter medications. Figure 13 splits the same two questions by whether or not the respondent had insurance post-HMP.

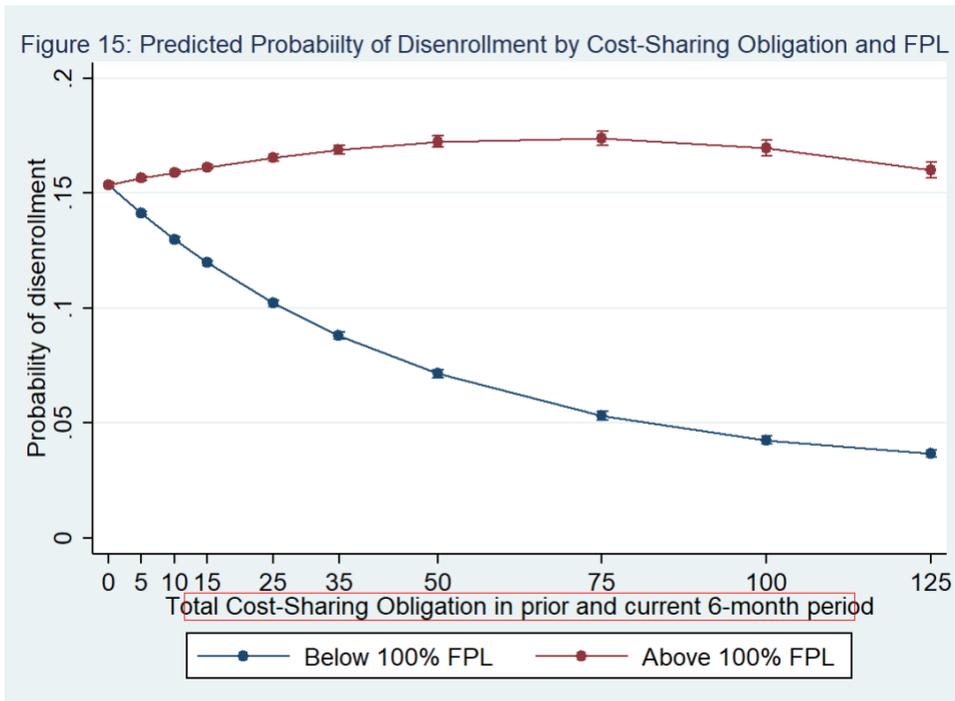


While agreement with both statements was high for both groups, those who did not have insurance post-HMP were less likely to agree that HMP's cost-sharing obligations were fair and affordable. Figure 14 shows that NLE survey respondents without cost-sharing obligations under HMP and those who did not pay their cost sharing obligation were more likely to report having no insurance post-HMP than those with such obligations. Those with invoices between \$0 and \$15 may be more likely

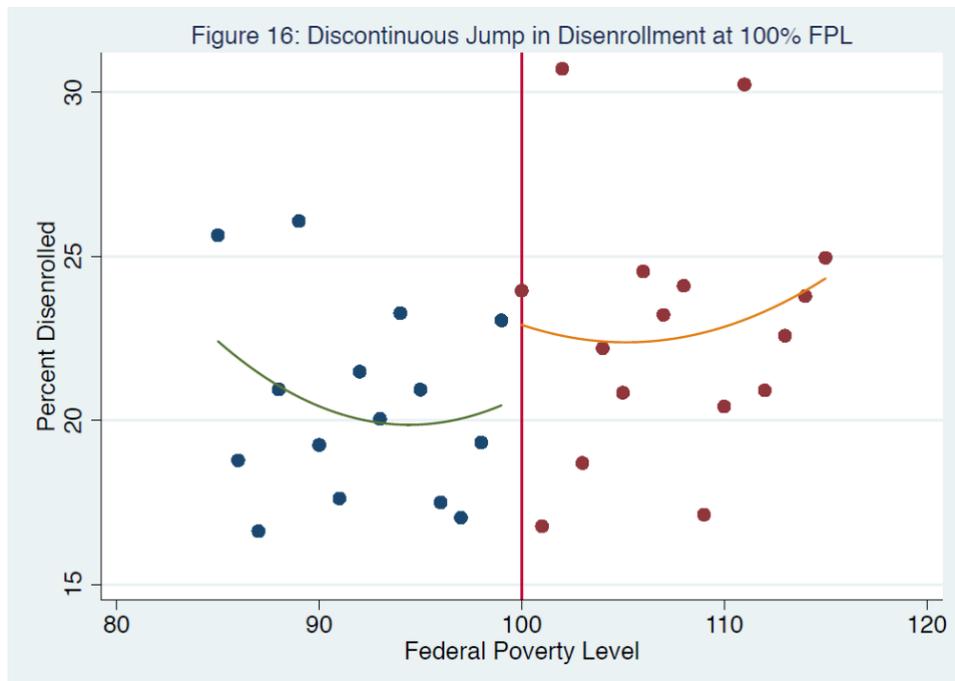


to transition to uninsurance, however that difference was not statistically significant, thus the differences could be attributed to statistical noise in the data given the relatively small sample. Finally, the relationship of cost obligation and payment compliance with not having insurance post-HMP is reported in Appendix Table 4.2 and was analyzed using regression models that control for observed enrollee characteristics. Because income (and hence contribution status) could vary over time, cost obligations and collections are averaged over the enrollee's time enrolled in HMP. In the first model, cost obligations are categorized as zero, positive up to \$15.00, and over \$15.00. As reported in the first section and shown in Appendix Table 1.1a, the overall average quarterly invoice in HMP for persons who face obligations but were below 100% FPL were \$4.85 whereas obligations for those above 100% FPL (and hence were potentially subject to monthly contributions) were \$26.71. Therefore, the higher category is likely dominated by persons who were typically over 100% FPL. That model finds that prior HMP enrollees in the \$0.01-\$15.00 category were more likely than those with no obligations to have insurance after they left HMP, though there was no significant difference between those without cost sharing obligations and those with > \$15.00 average quarterly invoice. No other characteristics significantly differentiated prior HMP enrollees' subsequent insurance status. Collapsing the three obligation categories into two (zero vs. positive obligations) in the second model yielded similar results, with prior HMP enrollees facing cost-sharing being more likely to have subsequent insurance coverage. The third model is restricted to those who had obligations and shows that subsequent insurance was more likely among prior HMP enrollees for whom collections data indicated higher levels of compliance in paying their obligations.

Results from the analysis of the full population show that people with any cost-sharing obligation are less likely to disenroll than those without such obligations (Appendix Table 4.3). However, the effects are different by income. Figure 15 shows the probability of disenrollment in a period by the amount owed on MI health account statements. For those below 100% FPL, who are subject to co-payments only, higher cost-sharing amounts are associated with a lower likelihood of disenrollment. For those above 100% FPL, who are subject to both monthly contributions and co-payments, higher cost-sharing obligations increase the probability of disenrollment up to about \$75, after which probability of disenrollment decreases with increasing cost. Looking at co-payments only by income level, higher co-payments are associated with less likelihood of disenrollment regardless of FPL (Appendix Figure 4.2d). We also found that having at least one claim in a prior period decreases likelihood of disenrollment (18.1% for those with no prior claims; 5.3% for those with at least one prior claim; Appendix Table 4.5). These results are consistent with the idea that those with higher medical needs are less likely to drop HMP coverage.



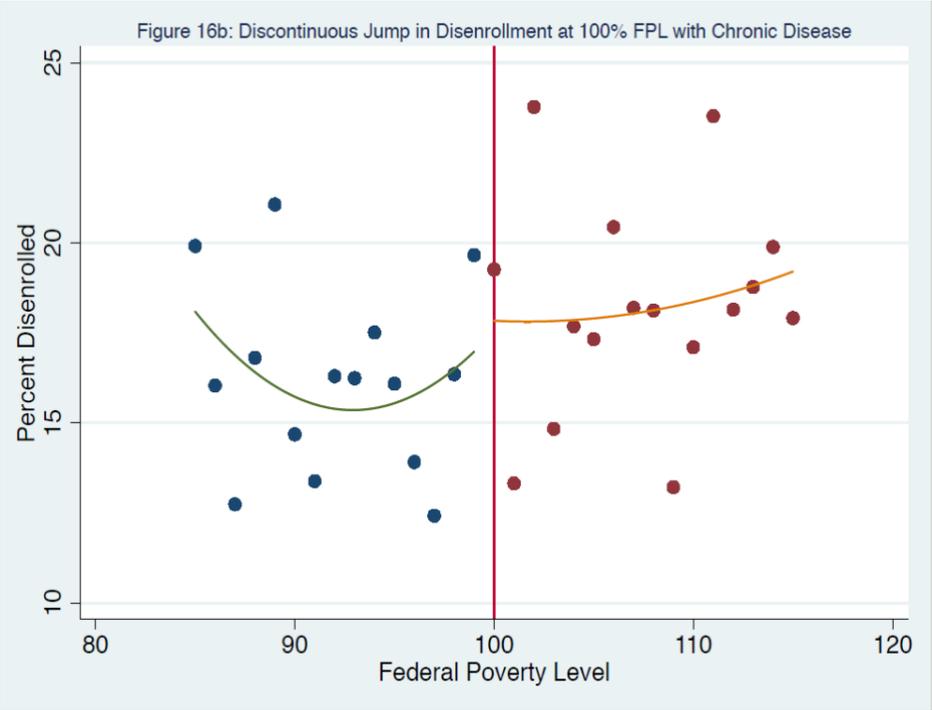
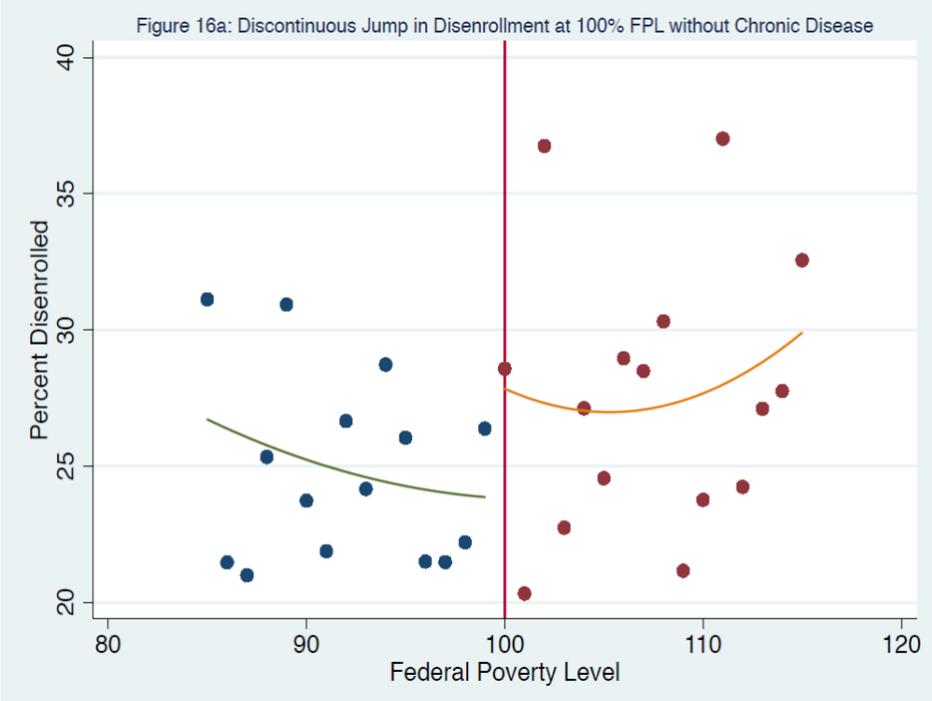
Looking specifically at the effect of monthly contributions on disenrollment, we found that at 100% FPL there is about a 2.6 percentage point jump in the probability of disenrollment. Restricting the analysis to those with monthly contributions, the jump at 100% FPL may be slightly higher, about 10 to 12 percentage points, though this result is sensitive to how we construct our model (Appendix Table 4.15).



Additionally, we split the population between those with no chronic disease claims and those with at least one chronic disease claim in their first 7 months of HMP-MC enrollment. As Figures 16a and 16b show, the jump in disenrollment at 100% FPL is higher for those without chronic disease claims.

When we model this jump, controlling for demographic factors and measuring the magnitude of the

jump, we find a statistically significant relationship only in the group without chronic disease claims (Appendix Table 4.9). Combined with our analysis showing lower disenrollment for those with co-payments, this result suggests that those who have medical needs remain in the program despite cost-sharing obligations. Populations with lower medical needs may leave the program, a result that is consistent with previous studies showing low willingness to pay for insurance among lower income individuals, especially those without high health needs.



We limited our analysis to those who do not switch to other Medicaid programs (in Michigan) and who do not return to a Michigan Medicaid program for at least 6 months after disenrollment. However, we do not know whether those who disenrolled gained health insurance coverage in some other way, such as through the commercial insurance market.

Overall, the vast majority of people surveyed after they had disenrolled from HMP said their payments were fair and affordable. These results also show that prior HMP enrollees who went uninsured after leaving HMP were less likely to report they felt cost-sharing was affordable or fair. Using the full population of HMP enrollees, we found evidence that contributions, but not co-payments, may induce a slight increase in disenrollment from HMP managed care plans. The jump in disenrollment is higher for those without chronic conditions in HMP suggesting that vulnerable populations maintain coverage despite higher cost-sharing obligations. Higher co-payments, likely the result of increased service use and an indication of higher medical need, are associated with less likelihood of disenrollment. This could indicate that enrollees who need health care are receiving it and are motivated to stay enrolled in the program. Additionally, our survey results found that those with cost-sharing obligations are also more likely to report gaining insurance after disenrollment from HMP, suggesting disenrollment among those with cost-sharing obligations may not always lead to uninsurance.

Hypothesis 4: Healthy Behavior Rewards and Healthy Behaviors

A. Exemptions from cost-sharing for chronic illnesses and rewards implemented through the MI Health Account framework for completing a health risk assessment with a primary care provider and agreeing to behavior changes will be associated with beneficiaries increasing their healthy behaviors and their engagement with healthcare decision-making relative to their initial year of enrollment.

B. This increase in healthy behaviors and engagement will be associated with an improvement in enrollees' health status over time, as measured by changes in elements of their health risk assessments and changes in receipt of recommended preventive care (e.g., flu shots, cancer screening) and adherence to prescribed medications for chronic disease (e.g., asthma controller medications).

Methods

This hypothesis was analyzed using two different data sources. The first part of the hypothesis took advantage of several questions in the 2016 Healthy Michigan Voices (HMV) current enrollee survey:

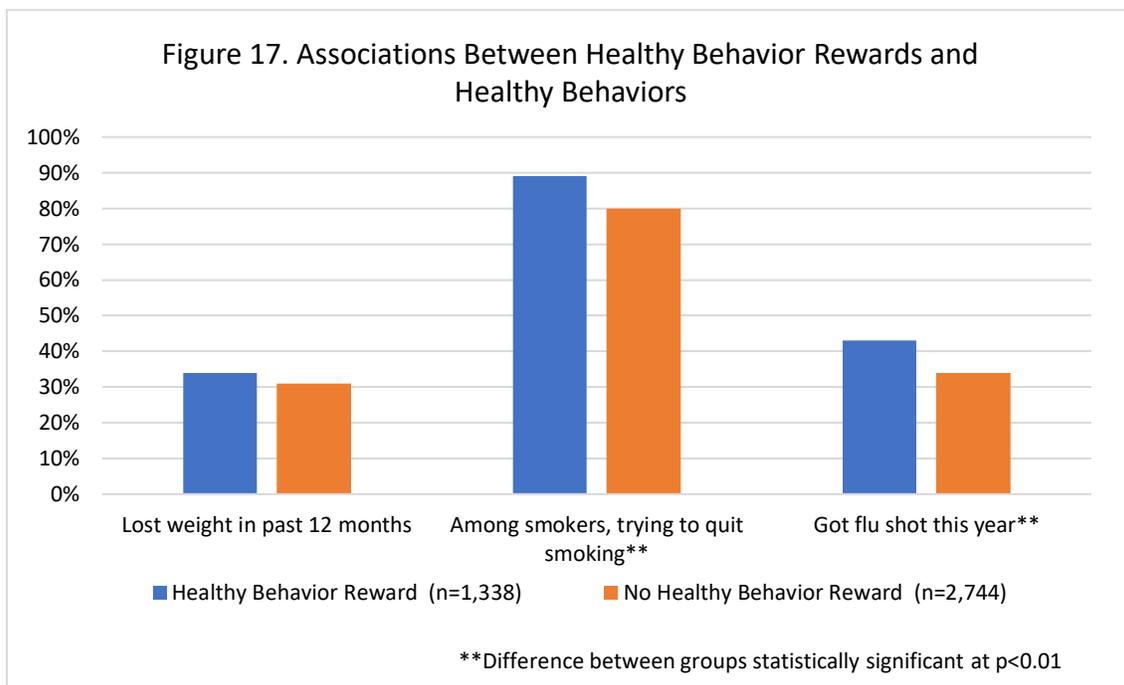
- Compared to 12 months ago, how would you describe your weight? Have you lost weight; gained weight; or stayed about the same
- [Asked of those who reported smoking or using tobacco in the past 30 days] Are you working on cutting back or quitting right now?
- Since July 1, 2015, have you had a flu vaccine?

We linked answers on the HMV current enrollee survey to data from MDHHS relating to attestation of health risk assessment and agreement to a Healthy Behavior. We correlated affirmation of a healthy behavior with answers to questions about changes in healthy behaviors.

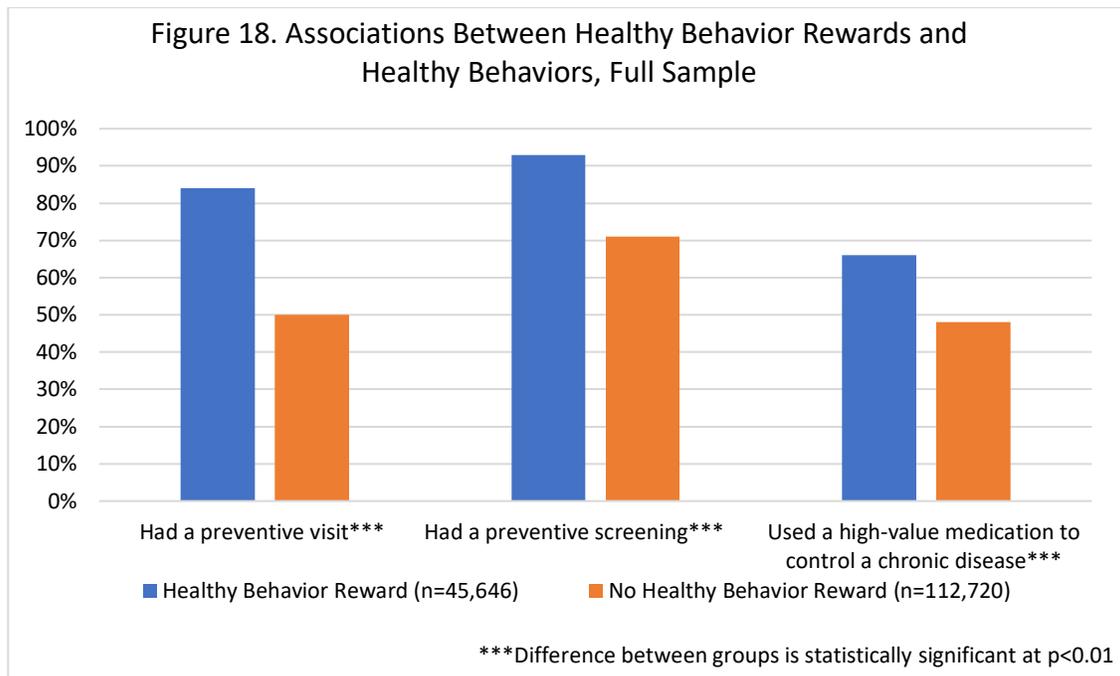
The second part of this hypothesis was tested using the same framework and population used in hypothesis 1 and 2, 22-64 year olds continuously enrolled for at least 18 months. We correlated affirmation of agreement to a healthy behavior with utilization of preventive services, preventive screenings and high-value medications. To measure service use, we used a subset of the services used for the analysis of hypothesis 2, with the same type of identification using flags to indicate receipt of service in a time period.

Results

Figure 17 shows the percent of current enrollees who reported engaging in health behaviors based on whether or not they received a healthy behavior reward. Those who received a healthy behavior reward were significantly more likely to say they were trying to quit smoking, and to report they had a flu shot. However, there was no statistically significant difference in the percentage of respondents who reported that they had lost weight in the past year. In a probit regression model that controlled for demographic characteristics (including FPL), respondents who lost weight were statistically less likely to have received a healthy behavior reward, though the magnitude of the difference is relatively small (30.5% vs. 31.9%). Other results from the probit regression confirmed the unadjusted analyses in Figure 17 (Appendix Table 5.1).



Further evidence was developed using the set of enrollees aged 22-62 who were continuously enrolled for at least 18 months. Individuals who earned a health behavior reward were more likely to have a preventive visit, a preventive screening, or to have used a co-pay exempt drug for a chronic condition (Figure 18), but it should be noted that these are correlations and do not prove that receipt of a reward caused these differences.



Appendix Figures 5.1, 5.2 and 5.3 track these outcomes over time. For preventive visits and screenings, use declined with time in the program for both reward recipients and non-recipients, but the higher use among recipients persisted. For use of co-pay exempt medications, rates for both groups rose over time, and use was again consistently higher among reward recipients. Results for the full regression models for these three measures are reported in Appendix Table 5.2. All use measures were higher for older and female enrollees and varied modestly by income, race and region.

Finally, Appendix Table 5.3 reports a “difference-in-differences” model for each measure. This can be interpreted as reflecting changes over time for enrollees. Those who received a reward at any point had lower use of preventive visits and screening, but higher use of co-pay exempt drugs in their second year of the program compared with those who never received a healthy behavior reward. Preventive visits and preventive screening declined over time for both those who did and did not receive a reward but declined more quickly for those who did. This result may reflect that many of these services are not needed every year, such that those who received a healthy behavior reward were more likely to get the screenings in their initial enrollment periods. The use of high-value medications, typically for controlling chronic disease, rose for both groups and rose more quickly for those who received a reward.

Limitations

This study has several limitations. First, the results should be interpreted cautiously due to the lack of a control group of similar enrollees not subject to co-payments and monthly contributions. Second, the classification into co-pay exempt and co-pay likely as a proxy for high- and low-value services is not straightforward and relied on the likelihood of cost-sharing rather than a direct assessment of value and encompassed only a fraction of all services. Because cost-sharing was imposed infrequently for many services, the set of commonly used services with a high likelihood of co-payments was

limited. Third, the relationship between preventive service use and reward receipt may reflect correlations due to the same people pursuing both rewards and preventive services rather than reward receipt causing subsequent preventive care use. Fourth, the NLE survey does not allow direct comparison to those who continued enrollment.

Conclusions

Cost-sharing implemented through MI Health Accounts, consisting of co-payment for some services and monthly contributions for higher-income enrollees, was intended to raise enrollees' awareness of the cost of care and encourage efficient and effective use of care. In the primary analysis cohort of non-elderly adult enrollees with at least 18 months of continuous enrollment, there was some indication that enrollees facing higher cost-sharing made more efficient use of medical services over time relative to those facing lower cost sharing. However, trends in the use of co-pay exempt and co-pay likely services were similar across income groups that faced different exposures to cost-sharing. Receipt of a healthy behavior reward was associated with attempts to quit smoking, receipt of a flu shot, and higher use of other preventive services, but not with weight loss. Finally, there was evidence of a relationship between cost-sharing and disenrollment, though with different effects. Enrollees with co-payments were more likely to stay in the program. Enrollees with contributions were more likely to disenroll but only when they did not have evidence of higher medical needs, supporting the idea that the HMP retains clinically vulnerable populations despite cost-sharing. Results from our survey of those who had disenrolled from the program found that those with cost-sharing obligations and those who paid on their obligations were more likely than those without to gain insurance post-HMP enrollment, suggesting disenrollment does not always lead to uninsurance.

**Report on the Impact of Cost Sharing
in the Healthy Michigan Plan**

Appendix A

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HMP Cost Share

Table 1.1 Average Invoice and Collection Amounts, Cross-Sectional

Average invoice, quarterly	\$8.59
Median invoice, quarterly	\$0.25
Average invoice (>\$0), quarterly	\$16.85
Median invoice (> \$0), quarterly	\$7.80
Average invoice, always < 100% FPL	\$4.85
Median invoice, always < 100% FPL	\$ 0.00
Average invoice, always > 100% FPL	\$26.71
Median invoice, always > 100% FPL	\$21.86
Fraction collected, overall*	0.39
Fraction collected, always < 100% FPL	0.38
Fraction collected, always > 100% FPL	0.41

*Fraction collected is conditional on having some cost-sharing obligation

Table 1.1a Invoice Amounts by Population and Collection Rates

	Average invoice (\$)	Number of enrollees
Total population	8.59	158,322
Subset of total population with cost obligation	16.85	80,743
Collection category (Total population)		
None collected	15.21	38,645
Partial collection	23.31	23,302
Full collection	12.20	18,796
Always below 100% FPL	4.85	130,926
Subset of always below 100% FPL with cost obligation	11.11	57,196
Collection category (Always below 100% FPL)		
None collected	10.25	28,605
Partial collection	16.15	14,749
Full collection	7.52	13,842
Switches between 100 % FPL during study period	24.40	2,839
Subset of switches between 100% FPL during study period with cost obligation	29.62	2,339
Collection category (Switches between 100 % FPL during study period)		
None collected	29.23	995
Partial collection	35.17	875
Full collection	20.10	469
Always above 100% FPL	26.71	24,557
Subset of always below 100% FPL with cost obligation	30.93	21,208
Collection category (Always above 100% FPL)		
None collected	29.40	9,045
Partial collection	35.72	7,678
Full collection	25.80	4,485

Table 1.2 Regression Analysis of Predictors of Payment (Cross-sectional); Marginal Effects from Multivariable Ordered Logit Model

	No payment	Partial payment	Full payment	<i>p-value on regression coefficient</i>
Age				
Under 30	ref	ref	ref	
30 to 39	0.008	-0.003	-0.004	0.135
40 to 49	-0.059	0.022	0.038	< 0.001
Over 50	-0.206	0.047	0.158	< 0.001
Female	-0.004	0.001	0.003	0.233
Race				
White	ref	ref	ref	
Black	0.310	-0.129	-0.181	< 0.001
American Indian	0.200	-0.070	-0.130	< 0.001
Hispanic	0.142	-0.044	-0.098	< 0.001
Asian/Pacific Islander	-0.086	0.008	0.079	< 0.001
Unknown	0.031	-0.007	-0.024	< 0.001
FPL				
0-35 %	ref	ref	ref	
36-99 %	-0.024	0.007	0.017	< 0.001
100+ %	-0.044	0.011	0.033	< 0.001
Region				
Upper Peninsula	ref	ref	ref	
Northwest	0.003	-0.001	-0.002	0.780
Northeast	0.020	-0.004	-0.015	0.048
West	0.024	-0.006	-0.019	0.002
East Central	0.036	-0.009	-0.027	< 0.001
East	0.032	-0.008	-0.024	< 0.001
South Central	0.038	-0.009	-0.029	< 0.001
Southwest	0.060	-0.016	-0.045	< 0.001
Southeast	0.025	-0.006	-0.019	0.005
Detroit Metro	0.025	-0.006	-0.019	0.001
Total number of enrollees in model	80,743			

Enrollees in model if they have received a non-zero invoice and have no missing covariate values

Table 1.3 Subset of Enrollees who Ever Paid on Cost Sharing Obligation: Average Fraction Collected Over Time; Mean Collection Rates, with Frequency, by Period

6-month period of enrollment	Fraction collected	Number of non-missing observations in each period
7-12 months	0.71	52,259
13-18 months	0.63	54,380
19-24 months	0.64	33,227
25-30 months	0.66	11,485
Total n(obvs) = 42,098		
Total n(obvs/periods)=151,351		

Table 1.3a Subset of Enrollees who Ever Paid on Cost Sharing Obligation: Average Fraction Collected Over Time; Mean Collection Rates, with Frequency, by Period

	Mean collection rates conditional on some collection, FPL <100		Mean collection rates conditional on some collection, FPL >=100	
	Fraction collected	Number of non-missing observations	Fraction collected	Number of non-missing observations
6-month period of enrollment				
7-12 months	0.72	34,972	0.70	17,287
13-18 months	0.64	35,333	0.63	19,047
19-24 months	0.64	21,590	0.64	11,637
25-30 months	0.66	7,813	0.65	3,672

Table 1.4 Predicted Percentage of Enrollees in Each Category of Collection Rate Category Among HMP Ever Payers, Ordered Logit Model, Bivariate and Multivariate Results

	Predicted percentage in each category per 6-month period of enrollment from ordered logit (Collection category on period; n= 151,351)				Predicted percentage in each category per 6-month period of enrollment from ordered logit with demographic controls (Collection category on period; n= 148,784)*			
	No payment	Partial payment	Full payment	<i>p-value on regression coefficient</i>	No payment	Partial payment	Full payment	<i>p-value on regression coefficient</i>
Time period								
7-12 months	22.2%	13.0%	64.8%		22.2%	13.0%	64.8%	
13-18 months	29.7%	14.8%	55.5%	< 0.001	29.8%	14.8%	55.4%	< 0.001
19-24 months	29.8%	14.9%	55.3%	< 0.001	30.0%	14.9%	55.1%	< 0.001
25-30 months	29.0%	14.7%	56.4%	< 0.001	29.8%	14.8%	55.4%	< 0.001

*Controls for age (in categories), FPL (in categories), race, gender and region

Table 1.5 Fixed Effects Models of Fraction Paid and Propensity to Pay All or None of Obligations

	Log odds of ever-paying individual paying in full, by period		Log odds of an ever-payer individual paying nothing, by period		Change in fraction collected by period among HMP ever payers, OLS with FE	
	Paid in full	<i>p-value on regression coefficient</i>	Paid nothing	<i>p-value on regression coefficient</i>	Marginal change in fraction paid, compared to reference	<i>p-value on regression coefficient</i>
Time period						
7-12 months	ref		ref		ref	
13-18 months	-0.68	< 0.001	0.58	< 0.001	-0.09	< 0.001
19-24 months	-0.67	< 0.001	0.44	< 0.001	-0.07	< 0.001
25-30 months	-0.50	< 0.001	0.22	< 0.001	-0.04	< 0.001
Total observations (People/periods)	85,500		73,593		151,351	

Notes: The interpretation of the logit fixed effects models (for paid all or paid nothing) are in log odds of payment. For example, moving from the reference group of 7-12 months to 13-18 months in the paid in full panel changes the log odds of paying in full by -0.60.

OLS with FE = Ordinary least squares regression with fixed effects. The interpretation on these predictions is as the marginal change in the fraction of the total obligation paid, compared with the baseline period of 7-12 months after first enrolling. In a fixed effects mode, any unchanging characteristics of enrollees (gender or region, for example) are held constant.

Table 1.6 Demographic Characteristics of Select Subgroup: Ever-Payer HMP Enrollees with 25+ months of continuous eligibility and 3+ MI Health Account statements

	Continuously enrolled in HMP-MC 18+ months; non-exclusion population	HMP ever-payer population with 25 months or more of eligibility 3 MI Health Account statements (subset of population represented in left column)
Age		
22-34	30.0%	19.4%
35-44	21.8%	16.9%
45-54	29.9%	31.9%
55-64	18.3%	31.9%
Female	54.5%	65.3%
Race		
White	64.0%	80.1%
Black	24.2%	10.4%
American Indian/Alaskan Native	0.5%	0.3%
Hispanic	2.8%	2.1%
Asian/Pacific Islander	0.5%	0.6%
Other race	7.9%	6.5%
FPL		
0 %	51.1%	19.7%
1-35 %	7.2%	12.5%
36-99 %	25.7%	40.9%
100+ %	15.9%	26.9%
Region		
Upper Peninsula	3.6%	6.4%
Northwest	2.6%	4.1%
Northeast	3.2%	5.5%
West	12.0%	13.3%
East Central	6.7%	8.6%
East	11.5%	12.9%
Southeast	6.8%	7.9%
South Central	4.1%	4.5%
Southwest	7.1%	7.2%
Detroit Metro	42.3%	29.7%
Total enrollees	158,369	15,736

Exclusion from HMP if not enrolled for 18 months continuously or part of an exclusion population (hospice care, nursing home care, children's special health care services)

Unable currently to exclude pregnant women. There is a reduction reason for pregnancy so these enrollees should not show up in cost-sharing tables with positive invoices.

Table 1.7 Fixed Effects Models of Fraction Paid and Propensity to Pay All or None of Obligations, Subset of Long Enrolled and Frequent MI Health Account Statement

	Log odds of each category in Chamberlin fixed effects model		Log odds of each category in Chamberlin fixed effects model		Fraction collected by period, ordinary least squares regression with fixed effects	
	Full payment	<i>p-value on regression coefficient</i>	No payment	<i>p-value on regression coefficient</i>	Marginal change in fraction paid, compared to reference	<i>p-value on regression coefficient</i>
Time period						
7-12 months	0		0		0	
13-18 months	-0.583	< 0.001	0.823	< 0.001	-0.098	< 0.001
19-24 months	-0.816	< 0.001	0.742	< 0.001	-0.103	< 0.001
25-30 months	-0.525	< 0.001	0.418	< 0.001	-0.054	< 0.001
Total observations (People/periods)	39,954		33,489		67,478	

Notes: The interpretation of the logit fixed effects models (for paid all or paid nothing) are in log odds of payment. For example, in the ‘paid in full’ panel, moving from the reference group of 7-12 months to 13-18 months changes the log odds of paying in full by -0.44.

OLS with FE = Ordinary least squares regression with fixed effects. The interpretation on these predictions is as the marginal change in the fraction of the total obligation paid, compared with the baseline period of 7-12 months after first enrolling. In a fixed effects mode, any unchanging characteristics of enrollees (gender or region, for example) are held constant.

Table 1.8 Sample Characteristics of Eligible HMV Respondents (n=1,669)

Characteristic	n	%
Average billed quarterly premium contributions		
\$0	1284	81.6
> \$0 to \$21	140	6.7
> \$21	245	11.4
Average billed quarterly copayments		
\$0	852	59.4
> \$0 to \$2	318	15.8
> \$2	499	24.8
Payment of billed contributions and copayments in past 12 months (n=884)		
0%	345	43.1
1% to 95%	236	26.3
> 95%	303	30.6
FPL category		
0% to 35%	700	53.3
36% to 99%	584	28.5
≥ 100%	385	18.2
Female, %	998	53.2
Age, %		
18 to 34	441	34.1
35 to 50	515	33.6
51 to 64	713	32.3
Race, %		
White	1155	61.3
Black	328	27.0
Other	113	8.1
More than one	53	3.5
Married or partnered	396	19.7
Good, very good, or excellent health status	1101	67.0
Chronic condition	544	30.9

Table 1.9 Associations between billed premium contributions and survey measures of health care affordability

Characteristic	Outcomes ¹					
	Payments affordable ² (n = 1,641)		Payments fair ³ (n = 1,641)		Foregone care due to cost ⁴ (n = 1,641)	
	Coefficient (95% CI)	P-value	Coefficient (95% CI)	P-value	Coefficient (95% CI)	P-value
Average billed quarterly premium contributions						
\$0 (reference)						
> \$0 to \$21	.05	.11	.02	.55	.002	.94
> \$21	-.02	.54	-.03	.55	-.02	.46
Average billed quarterly copayments						
\$0 (reference)						
> \$0 to \$2	.02	.49	.02	.44	-.003	.88
> \$2	.01	.74	.01	.57	.02	.28
FPL category						
0 to 35% (reference)						
36 to 99%	.005	.82	.01	.60	-.01	.50
≥ 100%	-0.56	.10	-.04	.29	-.01	.67
Female	-.02	.25	-.01	.57	.04	.02
Age						
18 to 34 (reference)						
35 to 50	.03	.26	.07	.02	-.02	.43
51 to 64	.05	.04	.06	.04	-.04	.06
Race						
White (reference)						
Black	-.05	.06	-.06	.04	-.02	.42
Other	-.08	.05	-.04	.39	.01	.69
More than one	-.04	.47	.01	.86s	.004	.93
Married or partnered	.04	.03	.02	.47	-.001	.95
G/VG/E health status	.05	.02	.04	.08	-.03	.15
Chronic condition	.01	.47	-.01	.74	.004	.84

CI = confidence interval; G = good; VG = very good; E = excellent

¹Each column represents a different multivariable linear probability model. ²Strongly agree or agree that payments affordable. ³Strongly agree or agree that payments fair. ⁴Went without health care in the past 12 months because 'you were worried about the cost,' 'you did not have health insurance,' 'the doctor or hospital wouldn't accept your health insurance,' or 'your health plan wouldn't pay for the treatment.'

Table 1.10 Associations between billed premium contributions and payments of bills for contributions and co-pays (n=867)

Characteristic	Coefficient (95%CI) ¹	P-value
Average billed quarterly premium contributions		
\$0 (ref)		
> \$0 to \$21	.42	.07
> \$21	.44	.03
Average billed quarterly copayments		
\$0 (ref)		
> \$0 to \$2	.30	.32
> \$2	.76	.007
FPL category		
0 to 35% (ref)		
36 to 99%	.28	.26
≥ 100%	-.13	.63
Female	.04	.80
Age		
18 to 34 (ref)		
35 to 50	-.03	.90
51 to 64	.76	< .001
Race		
White (ref)		
Black	-1.52	< .001
Other	-.38	.22
More than one	-.33	.61
Married or partnered	-.25	.16
Good, very good, or excellent health status	1.05	< .001
Chronic condition	-.05	.75

CI = confidence interval

¹Coefficients represent the log-odds of being in a higher payment category relative to lower payment categories.

Table 1.11 Marginal Effects from Logit Regression of Demographics on Garnishment

	Coefficient	<i>p-value on regression coefficient</i>
Age		
Under 30	ref	
30 to 39	0.002	0.050
40 to 49	-0.001	0.380
Over 50	-0.004	< 0.001
Female	0.007	< 0.001
Race		
White	0.011	< 0.001
Black	-0.008	0.080
American Indian	0.003	0.101
Hispanic	-0.014	0.006
Asian/Pacific Islander	-0.001	0.499
Unknown	0.011	< 0.001
FPL		
0-35 %	ref	
36-99 %	0.008	< 0.001
100+ %	0.040	< 0.001
Region		
Upper Peninsula	ref	
Northwest	0.000	0.888
Northeast	0.000	0.940
West	-0.002	0.449
East Central	0.001	0.732
East	0.002	0.370
South Central	0.003	0.290
Southwest	0.000	0.886
Southeast	-0.001	0.573
Detroit Metro	-0.006	0.002
Total people	158,322	

Table 1.12 Number of Enrollees with Garnishments in 2016, by Collection Category

	No payment	Partial payment	Full payment	Totals
No garnishment	36,684	22,433	18,745	77,862
Garnishment	1,961	869	51	2,881

Figure 1.1 Mean Federal Poverty Level, Cross-Sectional. Average FPL per enrollee from enrollment data, with 0 FPL included

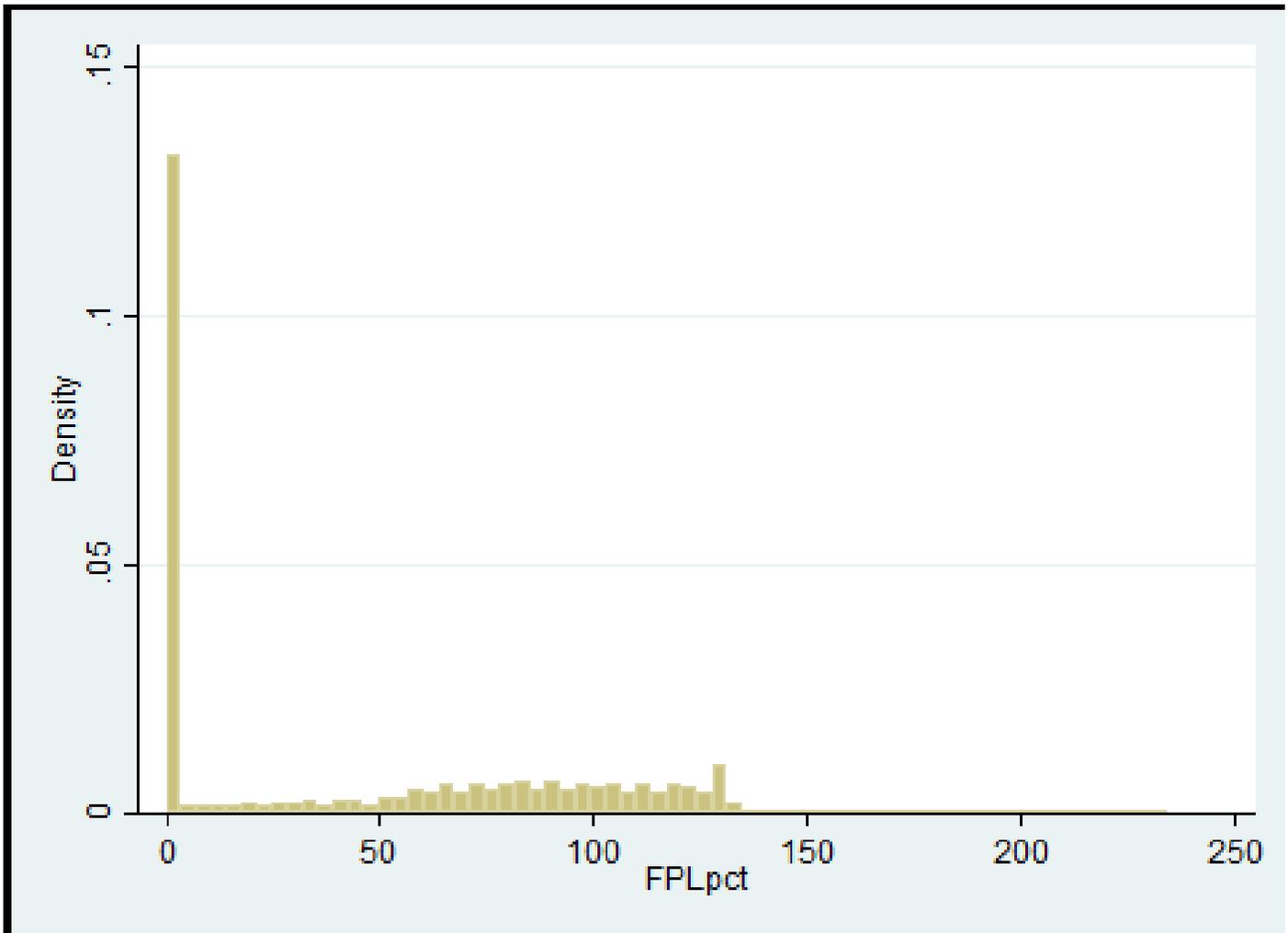


Figure 1.1a Mean Federal Poverty Level, Cross-Sectional. Average FPL per enrollee from enrollment data, without 0 FPL included

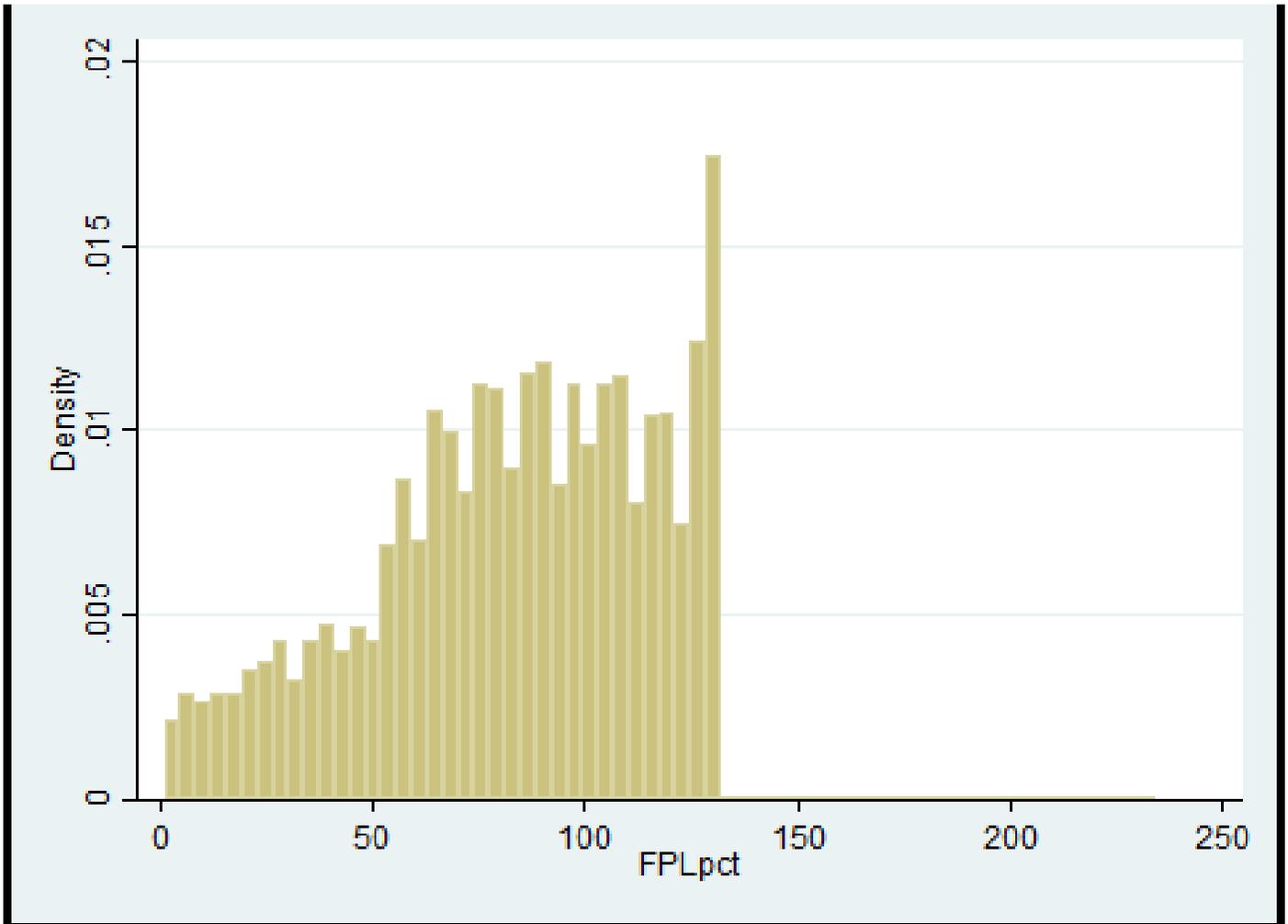


Figure 1.2 Percent Paid Over Time in 25+ Month Subset

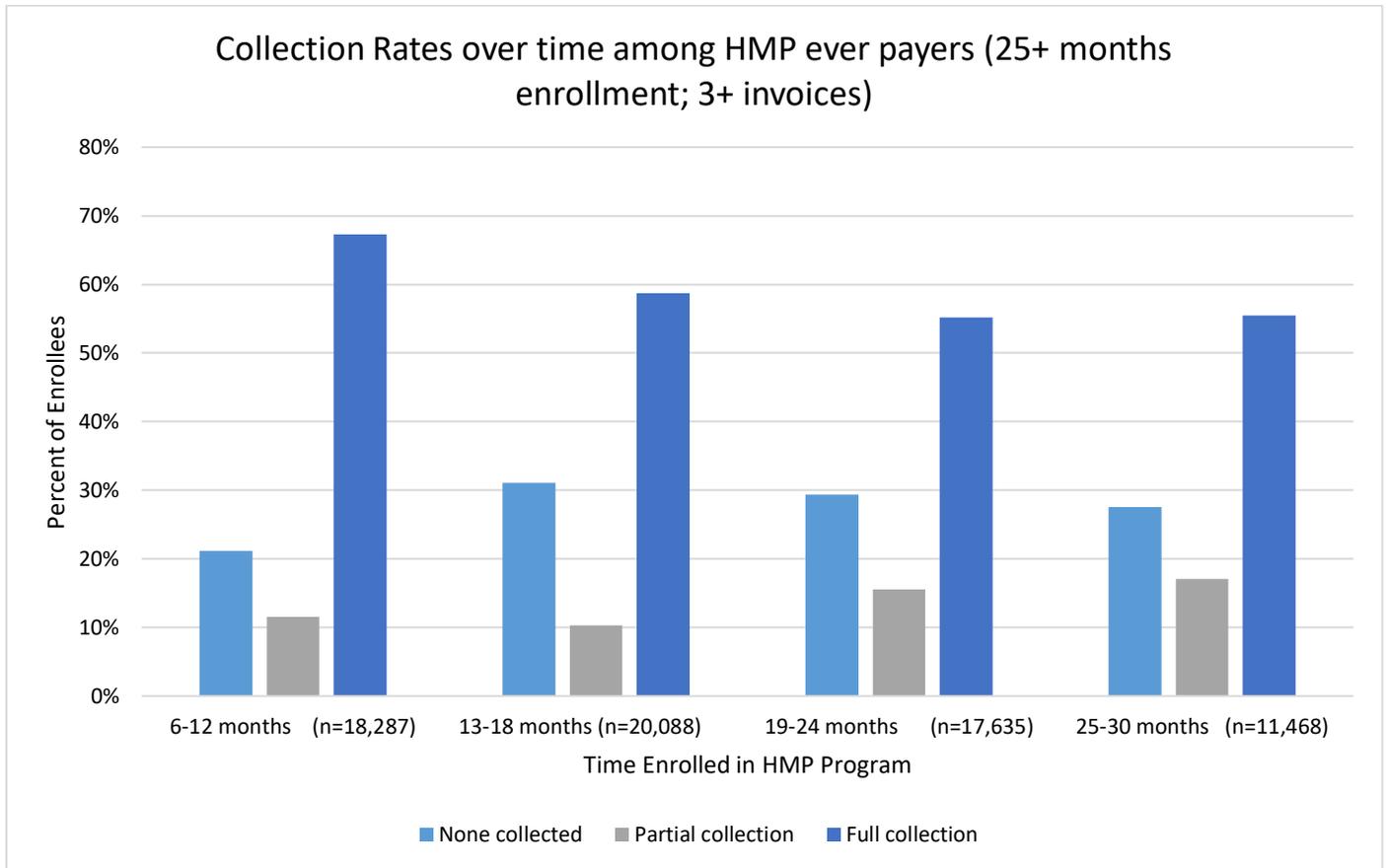
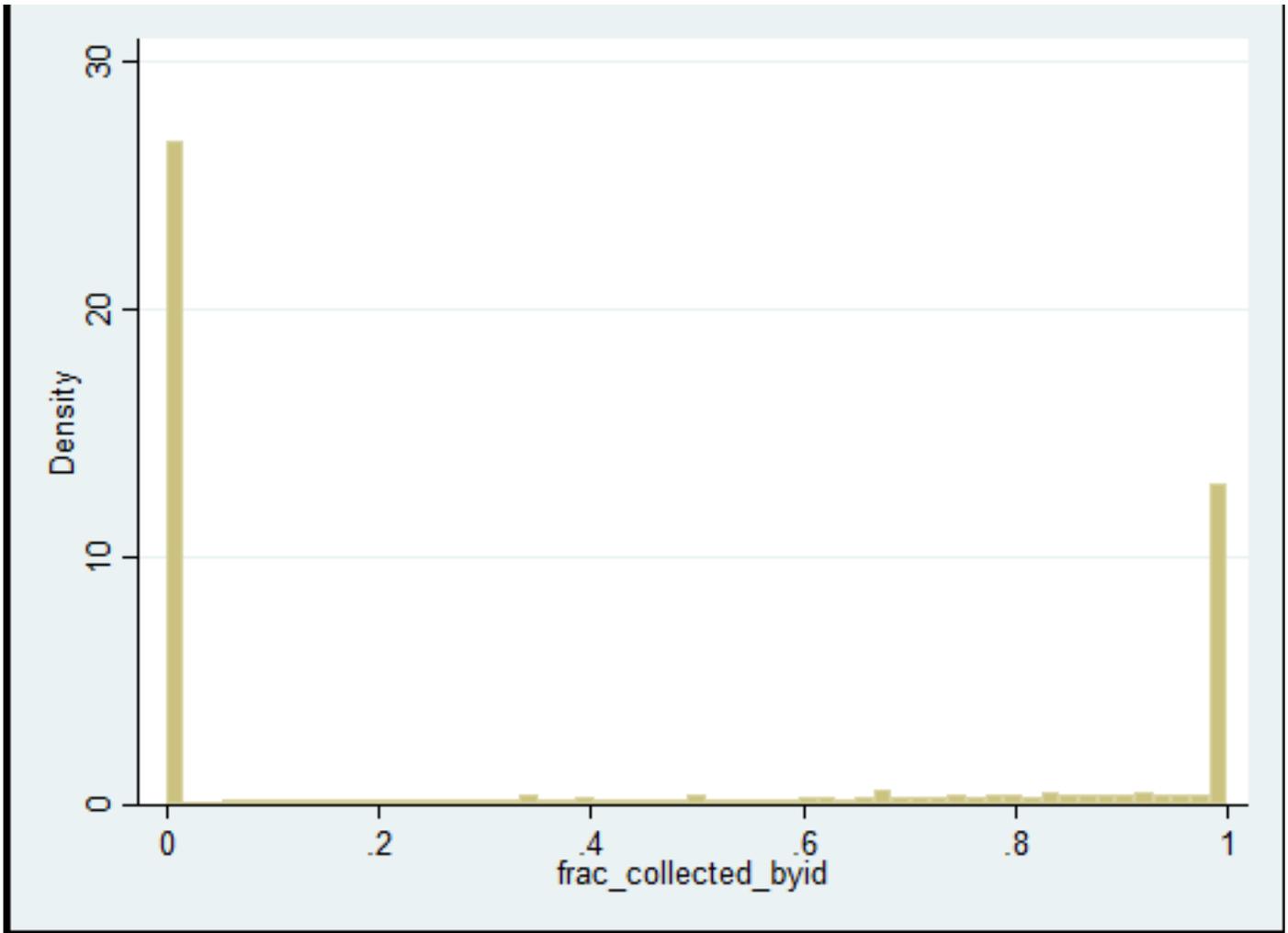


Figure 1.3 Payment Fraction Collected, Cross-Sectional Analysis



Note: In this graph the x-axis label, `frac_collected_byid` is the fraction of the invoice collected for each individual. This graph shows the density of collected fraction of invoices for HMP-MC individuals. The highest density (most individuals) have 0% of invoices collected, followed by 100% of invoice amounts collected. True fractions (between 0% and 100%) are more rare.

Hypothesis 1: Total Medical and Pharmaceutical Spending

Table 2.1 Cross-Sectional Descriptive Spending Results (April 2014 to Sept 2016)

	Overall	Mean FPL: 0-35 %	Mean FPL: 36-99 %	Mean FPL: 100+ %
Average monthly total spend	\$ 360.04	\$ 390.55	\$ 313.32	\$ 326.97
Average monthly medical spend	\$ 238.44	\$ 257.54	\$ 209.66	\$ 217.05
Average monthly Rx spend	\$ 121.60	\$ 133.01	\$ 103.66	\$ 109.92
Median monthly total spend	\$ 135.63	\$ 151.60	\$ 122.07	\$ 114.09
Median monthly medical spending	\$ 90.61	\$ 98.58	\$ 83.53	\$ 79.11
Median monthly Rx spending	\$ 18.27	\$ 21.72	\$ 15.24	\$ 14.42
Total enrollees	158,366	90,965	39,994	27,404

Table 2.2 Cross-Sectional Regression Analysis of Spending on Demographic Variables; Predicted Spending from GLM Regression

	Monthly total spending	<i>p-value on regression coefficient</i>	Monthly medical spending	<i>p-value on regression coefficient</i>	Monthly pharmaceutical spending	<i>p-value on regression coefficient</i>
Age						
Under 30	223.57		155.16		67.73	
30 to 39	295.32	< 0.01	191.45	< 0.01	103.06	< 0.01
40 to 49	408.62	< 0.01	262.88	< 0.01	145.99	< 0.01
Over 50	438.01	< 0.01	295.15	< 0.01	144.06	< 0.01
Gender						
Male	322.95		203.48		119.72	
Female	392.36	< 0.01	269.34	< 0.01	123.21	0.12
Race						
White	380.05		253.47		126.90	
Black	327.23	< 0.01	211.85	< 0.01	115.01	< 0.01
American Indian	560.96	0.11	417.77	0.11	141.91	0.20
Hispanic	342.06	0.01	219.04	< 0.01	122.37	0.67
Asian/Pacific Islander	247.71	< 0.01	159.12	< 0.01	89.17	0.02
Unknown	304.22	< 0.01	205.59	< 0.01	100.10	< 0.01
FPL						
0-35 %	396.05		263.67		133.18	
36-99 %	311.97	< 0.01	206.93	< 0.01	104.65	< 0.01
100+ %	314.44	< 0.01	206.24	< 0.01	107.48	< 0.01
Region						
Upper Peninsula	308.72	< 0.01	191.53	< 0.01	118.33	0.47
Northwest	322.63	< 0.01	206.43	< 0.01	116.93	0.38
Northeast	301.28	< 0.01	196.44	< 0.01	106.01	0.01
West	374.36	0.02	239.58	0.68	134.80	< 0.01
East Central	326.16	< 0.01	210.76	< 0.01	117.06	0.23
East	339.99	< 0.01	231.15	0.11	109.33	< 0.01
South Central	310.95	< 0.01	198.10	< 0.01	113.56	0.11
Southwest	356.18	0.53	236.96	0.87	120.44	0.60
Southeast	504.38	< 0.01	369.24	< 0.01	135.03	0.02
Detroit Metro	360.77		237.85		122.55	
Other health insurance						
No	353.50		234.52		119.38	
Yes	466.99	< 0.01	307.65	< 0.01	157.04	< 0.01
Total people	158,366					

Table 2.2a Coefficients from Other Regression Specifications of Spending

	Spending outcomes using ordinary least squares regression model (n=158,366)					Spending outcomes using generalized linear model -coefficients (n=158,366)					Marginal effects from generalized linear model- marginal effects (n=158,366)				
	Monthly spending	p-value on regression coefficient	Monthly medical spending	p-value on regression coefficient	Monthly pharmaceutical spending	p-value on regression coefficient	Monthly spending	p-value on regression coefficient	Monthly medical spending	p-value on regression coefficient	Monthly pharmaceutical spending	p-value on regression coefficient	Monthly spending	Monthly medical spending	Monthly pharmaceutical spending
Age															
Under 30	ref		ref		ref		ref		ref		ref		ref	ref	ref
30 to 39	74.69	< 0.01	38.55	< 0.01	36.15	< 0.01	0.28	< 0.01	0.21	< 0.01	0.42	< 0.01	71.75	36.29	35.34
40 to 49	186.84	< 0.01	106.98	< 0.01	79.86	< 0.01	0.60	< 0.01	0.53	< 0.01	0.77	< 0.01	185.06	107.72	78.27
Over 50	209.72	< 0.01	134.05	< 0.01	75.66	< 0.01	0.67	< 0.01	0.64	< 0.01	0.75	< 0.01	214.44	139.99	76.33
Gender															
Male	ref		ref		ref		ref		ref		ref		ref	ref	ref
Female	66.13	< 0.01	58.69	< 0.01	7.43	< 0.01	0.19	< 0.01	0.28	< 0.01	0.03	0.12	70.14	67.00	3.49
Race															
White	ref		ref		ref		ref		ref		ref		ref	ref	ref
Black	-56.53	< 0.01	-44.39	< 0.01	-12.14	< 0.01	-0.15	< 0.01	-0.18	< 0.01	-0.10	< 0.01	-52.82	-41.62	-11.88
American Indian	194.66	0.22	178.05	0.26	16.62	0.15	0.39	0.11	0.50	0.11	0.11	0.20	180.91	164.30	15.01
Hispanic	-45.70	< 0.01	-39.26	< 0.01	-6.43	0.44	-0.11	0.01	-0.15	< 0.01	-0.04	0.67	-37.99	-34.43	-4.52
Asian/Pacific Islander	-136.95	< 0.01	-101.52	< 0.01	-35.43	0.01	-0.43	< 0.01	-0.47	< 0.01	-0.35	0.02	-132.34	-94.35	-37.73
Unknown	-78.00	< 0.01	-51.96	< 0.01	-26.03	< 0.01	-0.22	< 0.01	-0.21	< 0.01	-0.24	< 0.01	-75.83	-47.88	-26.79
FPL															
0-35 %	ref		ref		ref		ref		ref		ref		ref	ref	ref
36-99 %	-84.46	< 0.01	-55.78	< 0.01	-28.68	< 0.01	-0.24	< 0.01	-0.24	< 0.01	-0.24	< 0.01	-84.08	-56.75	-28.54
100+ %	-75.01	< 0.01	-51.25	< 0.01	-23.76	< 0.01	-0.23	< 0.01	-0.25	< 0.01	-0.21	< 0.01	-81.61	-57.43	-25.70
Region															
Upper Peninsula	-59.65	< 0.01	-54.31	< 0.01	-5.34	0.34	-0.16	< 0.01	-0.22	< 0.01	-0.04	0.47	-52.05	-46.32	-4.22
Northwest	-42.57	< 0.01	-36.80	< 0.01	-5.77	0.37	-0.11	< 0.01	-0.14	< 0.01	-0.05	0.38	-38.14	-31.42	-5.63
Northeast	-60.02	< 0.01	-45.43	< 0.01	-14.59	0.01	-0.18	< 0.01	-0.19	< 0.01	-0.15	0.01	-59.49	-41.41	-16.54
West	16.22	0.01	0.98	0.82	15.24	< 0.01	0.04	0.02	0.01	0.68	0.10	< 0.01	13.59	1.73	12.25
East Central	-34.51	< 0.01	-28.41	< 0.01	-6.10	0.14	-0.10	< 0.01	-0.12	< 0.01	-0.05	0.23	-34.60	-27.09	-5.49
East	-21.56	< 0.01	-9.39	0.03	-12.17	< 0.01	-0.06	< 0.01	-0.03	0.11	-0.11	< 0.01	-20.78	-6.70	-13.23
South Central	-46.82	< 0.01	-40.92	< 0.01	-5.90	0.27	-0.15	< 0.01	-0.18	< 0.01	-0.08	0.11	-49.81	-39.76	-8.99
Southwest	-2.75	0.70	-1.93	0.73	-0.82	0.83	-0.01	0.53	< 0.01	0.87	-0.02	0.60	-4.59	-0.89	-2.12
Southeast	143.36	< 0.01	134.48	< 0.01	8.88	0.05	0.34	< 0.01	0.44	< 0.01	0.10	0.02	143.61	131.39	12.48
Detroit Metro	ref		ref		ref		ref		ref		ref		ref	ref	
Other health insurance															
No	ref		ref		ref		ref		ref		ref		ref	ref	ref
Yes	126.62	< 0.01	84.35	< 0.01	42.27	< 0.01	0.28	< 0.01	0.27	< 0.01	0.27	< 0.01	100.31	64.84	33.34

Table 2.3 Descriptive Spending by Year, with Poverty Level Splits

	Average per month total spending	Average per month medical spending	Average per month pharmaceutical spending	Enrollee/months
Overall				
Year 1	340.72	240.21	100.52	1,900,428
Year 2	377.87	235.12	142.75	1,597,191
Year 3	447.70	254.63	193.07	239,782
FPL 0-35 %				
Year 1	365.72	255.81	109.91	1,110,806
Year 2	423.89	264.39	159.50	949,918
Year 3	496.01	282.64	213.37	155,770
FPL 33-99 %				
Year 1	292.36	207.47	84.88	473,081
Year 2	311.12	195.38	115.73	392,257
Year 3	367.83	211.90	155.93	53,652
FPL 100+ %				
Year 1	325.31	234.40	90.91	316,505
Year 2	309.16	187.19	121.97	254,980
Year 3	341.12	186.49	154.63	30,342

Table 2.3a Descriptive Spending by 6-month Period

	Mean spending	Mean medical spending	Mean Pharmaceutical spending	Enrollee/months
Time period of enrollment				
All enrollees				
0-6 months	317.76	229.67	88.09	950,214
7-12 months	363.69	250.74	112.95	950,214
13-18 months	365.05	233.00	132.04	950,214
19-24 months	396.71	238.23	158.48	646,977
25-30 months	447.70	254.63	193.07	239,782
Enrollees with FPL 0-35 %				
0-6 months	340.99	244.61	96.38	554,530
7-12 months	390.37	266.96	123.40	556,276
13-18 months	409.03	262.19	146.83	560,021
19-24 months	445.23	267.55	177.68	389,897
25-30 months	496.01	282.64	213.37	155,770
Enrollees with FPL 36-99 %				
0-6 months	269.90	195.05	74.85	237,068
7-12 months	314.91	219.95	94.96	236,013
13-18 months	299.92	190.85	109.07	234,732
19-24 months	327.80	202.14	125.66	157,525
25-30 months	367.83	211.90	155.93	53,652
Enrollees with FPL 100+ %				
1-6 months	308.06	229.19	78.87	158,598
7-12 months	342.63	239.63	103.00	157,907
13-18 months	304.96	191.48	113.47	155,443
19-24 months	315.73	180.49	135.24	99,537
25-30 months	341.12	186.49	154.63	30,342

Table 2.4 Spending, including by Time Enrolled in Program, Predicted Effects from GLM Regression

	Predicted average monthly spending	<i>p-value on regression coefficient</i>	Predicted average monthly medical spending	<i>p-value on regression coefficient</i>	Predicted average monthly pharmaceutical spending	<i>p-value on regression coefficient</i>
Time period						
Months 0 -6	320.82		231.44		89.49	
Months 7-12	363.48	< 0.01	248.50	0.011	114.54	< 0.01
Months 13-18	368.30	< 0.01	236.60	0.248	132.23	< 0.01
Months 19-24	391.33	< 0.01	240.44	0.067	151.07	< 0.01
Months 25-30	422.98	< 0.01	243.24	0.028	179.46	< 0.01
FPL						
0-35 %	404.26		266.10		139.11	
36-99 %	309.40	0.922	202.32	0.220	106.69	< 0.01
100+ %	317.37	0.853	202.92	0.226	112.07	< 0.01
Age						
Under 30	229.18		156.85		71.67	
30 to 39	301.72	< 0.01	192.40	< 0.01	108.74	< 0.01
40 to 49	412.10	< 0.01	260.85	< 0.01	151.60	< 0.01
Over 50	440.08	< 0.01	293.48	< 0.01	147.05	< 0.01
Gender						
Male	329.41		204.24		125.09	
Female	398.24	< 0.01	270.09	< 0.01	128.37	0.020
Race						
White	385.81		253.10		132.48	
Black	331.91	< 0.01	213.45	< 0.01	119.12	< 0.01
American Indian	607.33	0.116	457.21	0.110	146.75	0.033
Hispanic	348.16	< 0.01	219.44	< 0.01	127.42	0.464
Asian/Pacific Islander	250.29	< 0.01	158.31	< 0.01	90.65	< 0.01
Unknown	312.98	< 0.01	208.55	< 0.01	105.74	< 0.01
Region						
Upper Peninsula	312.51	< 0.01	191.02	< 0.01	121.45	0.077
Northwest	331.41	< 0.01	208.94	< 0.01	122.57	0.159
Northeast	309.87	< 0.01	199.40	< 0.01	111.05	< 0.01
West	381.81	< 0.01	242.19	0.216	140.84	< 0.01
East Central	333.21	< 0.01	213.23	< 0.01	121.09	0.016
East	347.13	< 0.01	233.59	0.156	112.90	< 0.01
South Central	317.60	< 0.01	200.83	< 0.01	118.72	0.016
Southwest	362.11	0.510	239.00	0.864	124.78	0.119
Southeast	512.25	< 0.01	362.87	< 0.01	141.29	< 0.01
Detroit Metro	366.02		238.06		128.54	
Other health insurance						
No	365.08		238.88		126.28	
Yes	407.47	0.016	262.46	0.045	144.32	< 0.01
Total observations (Enrollee/periods)	681,712		681,712		681,712	

Table 2.4a Predicted Spending with FPL/Time Interactions and Demographics, Predicted Effects from GLM Regressions

	Total monthly spending	<i>p-value on regression coefficient</i>	Medical monthly spending	<i>p-value on regression coefficient</i>	Monthly pharmaceutical spending	<i>p-value on regression coefficient</i>
Time period and Federal poverty level						
0-6 Months: Below 35%	343.38		247.03		97.15	
0-6 Months: 36-99% FPL	271.79	< 0.01	194.88	< 0.01	76.79	< 0.01
0-6 Months: Above 100% FPL	305.12	0.114	222.59	0.233	79.68	< 0.01
7-12 Months: Below 35% FPL	388.46	< 0.01	264.99	0.013	123.75	< 0.01
7-12 Months: 36-99% FPL	320.22	0.358	219.75	0.360	98.22	0.909
7-12 Months: Above 100% FPL	329.18	0.613	224.76	0.603	103.71	0.586
13-18 Months: Below 35% FPL	413.06	< 0.01	268.29	< 0.01	145.55	< 0.01
13-18 Months: 36-99% FPL	307.08	0.022	195.35	0.014	111.69	0.447
13-18 Months: Above 100% FPL	306.32	0.020	191.42	0.010	114.88	0.346
19-24 Months: Below 35% FPL	445.17	< 0.01	277.76	< 0.01	168.04	< 0.01
19-24 Months: 36-99% FPL	321.46	0.011	199.08	0.018	122.41	0.033
19-24 Months: Above 100% FPL	314.41	< 0.015	179.01	< 0.01	134.41	0.648
25- 30 Months: Below 35% FPL	483.89	< 0.01	281.84	< 0.01	201.49	< 0.01
25- 30 Months: 36-99% FPL	348.52	0.010	201.87	0.031	147.28	0.141
25- 30 Months: Above 100% FPL	321.69	< 0.011	171.87	< 0.01	148.99	0.144
Age						
Under 30	228.85		156.48		71.70	
30 to 39	301.95	< 0.01	192.64	< 0.01	108.77	< 0.01
40 to 49	412.24	< 0.01	260.85	< 0.01	151.65	< 0.01
Over 50	440.07	< 0.01	293.29	< 0.01	147.13	< 0.01
Gender						
Male	329.50		204.11		125.14	
Female	398.30	< 0.01	270.08	< 0.01	128.43	0.019
Race						
White	253.07	< 0.01			132.53	0.011
Black	213.39	< 0.01		< 0.01	119.22	< 0.01
American Indian	451.02	0.113		0.107	146.87	0.033
Hispanic	219.39	< 0.01		< 0.01	127.42	0.457

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Asian/Pacific Islander	158.57	< 0.01		< 0.01	90.64	< 0.01
Unknown	208.65	< 0.01		< 0.01	105.77	< 0.01
Region						
Upper Peninsula	313.28	< 0.01	191.31	< 0.01	121.54	0.077
Northwest	331.42	< 0.01	209.31	< 0.01	122.52	0.148
Northeast	310.89	< 0.01	199.81	< 0.01	111.36	< 0.01
West	381.84	< 0.01	242.18	0.243	140.89	< 0.01
East Central	333.65	< 0.01	213.44	< 0.01	121.23	0.017
East	347.15	< 0.01	233.77	0.149	112.89	< 0.01
South Central	317.82	< 0.01	200.86	< 0.01	118.84	0.016
Southwest	362.21	0.483	238.81	0.924	124.87	0.122
Southeast	509.60	< 0.01	359.71	< 0.01	141.28	< 0.01
Detroit Metro	366.33	< 0.01	238.30		128.59	< 0.01
Other health insurance						
No	365.21		238.86		126.35	
Yes	405.21	0.018	260.90	0.057	143.96	< 0.01
Total observations (Enrollee/months)	681,697		681,697		681,697	

Table 2.4b Subset of HMP Enrollees with Cost Sharing Obligations: Predicted Spending with FPL and Time Interactions, Demographics and Collection Rates

	Total monthly spending	p-value on regression coefficient	Monthly medical spending	p-value on regression coefficient	Monthly pharmaceutical spending	p-value on regression coefficient
Collection category						
None collected	349.67		236.54		112.97	
Partial collection	364.43	0.027	231.56	0.328	134.88	< 0.01
Full collection	331.41	0.049	216.47	0.018	113.59	0.805
Time period						
Months 0-6	312.51		228.37		84.24	
Months 7-12	348.10	0.013	239.63	0.283	108.45	< 0.01
Months 13-18	351.82	< 0.01	227.85	0.941	124.46	< 0.01
Months 19-24	366.72	< 0.01	224.46	0.577	142.20	< 0.01
Months 25-30	396.78	< 0.01	226.71	0.823	169.65	< 0.01
FPL						
0-35 %	397.67		264.57		135.18	
36-99 %	325.68	< 0.01	214.60	< 0.01	111.36	< 0.01
100+ %	320.55	< 0.01	206.88	< 0.01	110.99	< 0.01
Age						
Under 30	228.21		158.74		66.59	
30 to 39	269.51	< 0.01	174.28	0.035	95.75	< 0.01
40 to 49	370.39	< 0.01	232.90	< 0.01	138.58	< 0.01
Over 50	444.03	< 0.01	298.45	< 0.01	146.12	< 0.01
Gender						
Male	322.01		196.65		125.64	
Female	364.36	< 0.01	248.11	< 0.01	116.31	< 0.01
Race						
White	360.75		239.80		120.74	
Black	329.72	< 0.01	208.47	< 0.01	122.29	0.576
American Indian	388.03	0.244	244.67	0.780	151.39	0.013
Hispanic	328.66	0.034	204.43	< 0.01	120.43	0.976
Asian/Pacific Islander	263.67	< 0.01	158.77	< 0.01	103.24	0.214
Unknown	303.29	< 0.01	205.07	< 0.01	101.53	< 0.01
Region						
Upper Peninsula	319.69	0.011	195.44	< 0.01	124.51	0.440
Northwest	321.87	0.019	208.36	0.014	113.23	0.184
Northeast	287.57	< 0.01	184.79	< 0.01	102.34	< 0.01
West	366.28	0.011	236.42	0.029	131.96	< 0.01
East Central	320.80	< 0.01	206.22	< 0.01	117.21	0.349
East	325.18	< 0.01	223.73	0.429	101.40	< 0.01
South Central	299.84	< 0.01	191.76	< 0.01	110.33	0.010
Southwest	350.17	0.649	228.70	0.748	123.09	0.440
Southeast	497.87	0.011	350.79	0.011	137.49	< 0.01
Detroit Metro	347.16		226.96		120.54	
Other health insurance						
No	348.84		229.74		119.12	
Yes	362.66	0.107	233.05	0.643	131.40	0.013
Total observations (Enrollee/periods)	340,254		340,254		340,254	

Table 2.5 Marginal Effects from a Fixed Effect Regression Model of Spending and Log of Spending

	Marginal difference in total monthly spending, compared to constant	<i>p-value on regression coefficient</i>	Marginal effects of log of total monthly spending	<i>p-value on regression coefficient</i>
Time period				
0-6 Months	ref		ref	
7-12 Months	45.91	< 0.01	-0.06	< 0.01
13-18 Months	48.47	< 0.01	-0.01	0.315
19-24 Months	74.11	< 0.01	-0.22	< 0.01
25-30 Months	110.09	< 0.01	-0.28	< 0.01
FPL				
0-35 %	ref		ref	
36-99 %	97.97	0.256	-0.02	0.566
100+ %	96.38	0.545	-0.04	0.194
Other health insurance				
No	ref		ref	
Yes	-71.26	0.479	-0.38	< 0.01
Constant	280.46		4.26	
Number enrollees	158,366		158,366	

Notes: The log of healthcare expenditures are often used in research rather than the actual dollar amounts because many people spend very little each month and a few people spend quite a bit. That spread of spending, particularly when a few numbers are much higher than most, has been shown difficult to model mathematically. Instead, using the log of the number, results in more accurate predictions. In this case, the log spending was taken by adding \$1 to each spending outcome because the log of \$0 is undefined.

Hypothesis 2: Medicaid Service Value – Medical Services

Table 3.1.1 Predicted Copay Exempt and Copay Likely Service Use from Probit Regression Model on Cross-Section of Enrollees; Predictions Signal Percent that ever used service during study period

	Copay exempt predicted use	<i>p-value on regression coefficient</i>	Copay likely predicted use	<i>p-value on regression coefficient</i>
FPL				
0-35 %	81.2%	ref	56.8%	ref
36-99 %	81.9%	0.01	55.8%	< 0.01
100+ %	81.7%	0.07	55.5%	< 0.01
Age				
Under 30	73.4%	ref	46.4%	ref
30 to 39	76.4%	< 0.01	52.4%	< 0.01
40 to 49	83.7%	< 0.01	59.8%	< 0.01
Over 50	87.3%	< 0.01	61.7%	< 0.01
Gender				
Male	73.3%	ref	50.7%	ref
Female	88.4%	< 0.01	61.1%	< 0.01
Race				
White	82.1%	ref	58.8%	ref
Black	79.8%	< 0.01	51.0%	< 0.01
American Indian	85.0%	0.02	37.1%	< 0.01
Hispanic	81.2%	0.10	55.9%	< 0.01
Asian/Pacific Islander	83.6%	0.25	55.4%	0.05
Unknown	81.1%	0.01	53.9%	< 0.01
Region				
Upper Peninsula	73.9%	< 0.01	54.5%	
Northwest	81.0%	< 0.01	52.7%	0.08
Northeast	79.7%	< 0.01	54.2%	0.79
West	80.8%	< 0.01	57.8%	< 0.01
East Central	81.0%	< 0.01	52.4%	0.01
East	83.1%	0.64	55.4%	0.20
South Central	78.2%	< 0.01	55.4%	0.32
Southwest	78.3%	< 0.01	49.3%	< 0.01
Southeast	79.2%	< 0.01	57.5%	< 0.01
Detroit Metro	83.2%	ref	58.4%	ref
Other health insurance				
No	81.5%	ref	56.5%	ref
Yes	81.4%	0.79	53.8%	< 0.01
Total enrollees	158,322		158,322	

Table 3.1.2 Predicted Copay Exempt and Copay Likely Service Use from Probit Regression Model on Repeated Cross-Sections of Enrollees; Predictions Signal Percent that ever used service in a time period since enrollment

	Copay exempt service use	<i>p-value on regression coefficient</i>	Copay likely service use	<i>p-value on regression coefficient</i>
Time period				
Months 0-6	56.6%		28.7%	
Months 7-12	43.5%	< 0.01	24.4%	< 0.01
Months 13-18	46.3%	< 0.01	22.8%	< 0.01
Months 19-24	36.0%	< 0.01	17.1%	< 0.01
Months 25-30	33.2%	< 0.01	16.7%	< 0.01
FPL				
0-35 %	44.8%		23.0%	
36-99 %	44.6%	0.11	22.5%	< 0.01
100+ %	44.3%	< 0.01	22.5%	< 0.01
Age				
Under 30	34.8%		17.3%	
30 to 39	37.5%	< 0.01	20.5%	< 0.01
40 to 49	46.8%	< 0.01	24.7%	< 0.01
Over 50	52.5%	< 0.01	25.5%	< 0.01
Gender				
Male	47.9%		19.4%	
Female	64.2%	< 0.01	25.6%	< 0.01
Race				
White	44.9%		24.1%	
Black	43.9%	< 0.01	20.0%	< 0.01
American Indian	46.9%	0.01	12.8%	< 0.01
Hispanic	45.6%	0.04	22.3%	< 0.01
Asian/Pacific Islander	46.7%	0.02	21.0%	< 0.01
Unknown	44.3%	< 0.01	21.1%	< 0.01
Region				
Upper Peninsula	37.6%	< 0.01	20.9%	< 0.01
Northwest	43.3%	< 0.01	22.0%	< 0.01
Northeast	42.1%	< 0.01	21.7%	< 0.01
West	44.1%	< 0.01	25.1%	< 0.01
East Central	44.1%	< 0.01	19.4%	< 0.01
East	46.4%	0.29	21.2%	< 0.01
South Central	41.1%	< 0.01	21.6%	< 0.01
Southwest	41.6%	< 0.01	18.9%	< 0.01
Southeast	42.3%	< 0.01	23.6%	< 0.01
Detroit Metro	46.6%		24.0%	< 0.01
Other health insurance				0.07
No	44.8%		22.9%	
Yes	39.9%	< 0.01	16.9%	< 0.01
Total observations (Enrollee/periods)	681,530		681,530	

Table 3.1.2a Predicted Copay Exempt and Copay Likely Service Use from Probit Regression Model on Repeated Cross-Sections of Enrollees; With Interactions for Time Period and Above/Below 100% FPL

	Copay exempt service use	<i>p-value on regression coefficient</i>	Copay likely service use	<i>p-value on regression coefficient</i>
Time period and Federal poverty level				
Months 0-6: Below 100% FPL	56.5%		28.9%	
Months 0-6: Above 100% FPL	57.0%	0.152	27.1%	< 0.01
Months 7-12: Below 100% FPL	43.4%	< 0.01	24.4%	< 0.01
Months 7-12: Above 100% FPL	43.2%	0.145	23.8%	0.026
Months 13-18: Below 100% FPL	46.2%	< 0.01	22.7%	< 0.01
Months 13-18: Above 100% FPL	46.3%	0.493	22.8%	< 0.01
Months 19-24: Below 100% FPL	36.3%	< 0.01	17.1%	< 0.01
Months 19-24: Above 100% FPL	33.9%	< 0.01	17.1%	< 0.01
Months 25-30: Below 100% FPL	33.9%	< 0.01	16.9%	< 0.01
Months 25-30: Above 100% FPL	29.3%	< 0.01	15.3%	0.516
Age				
Under 30	34.8%		17.3%	
30 to 39	37.5%	< 0.01	20.5%	< 0.01
40 to 49	46.7%	< 0.01	24.7%	< 0.01
Over 50	52.4%	< 0.01	25.4%	< 0.01
Gender				
Male	36.4%		19.4%	
Female	51.4%	< 0.01	25.5%	< 0.01
Race				
White	44.8%		24.1%	
Black	43.9%	< 0.01	19.9%	< 0.01
American Indian	46.7%	0.017	12.9%	< 0.01
Hispanic	45.5%	0.076	22.1%	< 0.01
Asian/Pacific Islander	46.7%	0.022	21.3%	< 0.01
Unknown	44.3%	0.017	21.1%	< 0.01
Region				
Upper Peninsula	37.5%	< 0.01	20.9%	< 0.01
Northwest	43.3%	< 0.01	21.9%	< 0.01
Northeast	42.0%	< 0.01	21.6%	< 0.01
West	44.0%	< 0.01	25.1%	< 0.01
East Central	44.0%	< 0.01	19.4%	< 0.01
East	46.3%	0.334	21.2%	< 0.01
South Central	41.0%	< 0.01	21.5%	< 0.01
Southwest	41.4%	< 0.01	18.8%	< 0.01
Southeast	42.3%	< 0.01	23.6%	0.072
Detroit Metro	46.5%		24.0%	

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Other health insurance				
No	44.7%		22.9%	
Yes	39.9%	< 0.01	16.9%	< 0.01
Total observations (Enrollee/periods)	669,398		669,398	

Note: The N here is slightly less than above because this regression excludes those who switch between < 100% FPL and > 100% FPL.

Table 3.1.2b Predicted Average Monthly Spending on Copay Exempt/ Copay Likely Services from Generalized Linear Model Regression

	Copay exempt medications	<i>p-value on regression coefficient</i>	Copay likely service spending	<i>p-value on regression coefficient</i>
Time period				
Months 0-6	30.54		10.03	
Months 7-12	22.85	< 0.01	9.03	< 0.01
Months 13-18	24.82	< 0.01	8.47	< 0.01
Months 19-24	22.75	< 0.01	6.66	< 0.01
Months 25-30	23.06	< 0.01	7.55	< 0.01
FPL				
0-35 %	25.87	< 0.01	8.92	< 0.01
36-99 %	23.96	< 0.01	7.98	< 0.01
100+ %	23.99	< 0.01	7.80	< 0.01
Age				
Under 30	17.15		5.47	
30 to 39	18.51	< 0.01	6.85	< 0.01
40 to 49	26.16	< 0.01	9.56	< 0.01
Over 50	32.31	< 0.01	10.25	< 0.01
Gender				
Male	17.74	0.168	7.17	< 0.01
Female	31.32	< 0.01	9.61	< 0.01
Race				
White	24.44	0.121	9.27	< 0.01
Black	26.67	< 0.01	7.02	< 0.01
American Indian	25.45	0.458	3.73	< 0.01
Hispanic	28.36	< 0.01	7.44	< 0.01
Asian/Pacific Islander	23.69	0.548	11.36	0.576
Unknown	23.90	0.146	7.53	< 0.01
Region				
Upper Peninsula	15.45	< 0.01	6.47	
Northwest	21.64	< 0.01	7.78	0.040
Northeast	21.31	< 0.01	6.47	0.990
West	23.47	< 0.01	10.10	< 0.01
East Central	19.85	< 0.01	5.63	0.054
East	24.89	< 0.01	7.50	0.047
South Central	21.89	< 0.01	8.79	0.141
Southwest	22.53	< 0.01	7.58	0.062
Southeast	22.57	< 0.01	9.90	< 0.01
Detroit Metro	28.86		9.12	0.234
Other health insurance				
No	25.17		8.57	
Yes	22.37	< 0.01	6.09	< 0.01
Total Enrollee/periods	681,530		681,530	

Table 3.1.2c Predicted Copay Exempt and Copay Likely Service Use from Probit Regression Model on Repeated Cross-Sections of Enrollees; With Interactions for Time Period and FPL Category

	Copay exempt service use	<i>p-value on regression coefficient</i>	Copay likely service use	<i>p-value on regression coefficient</i>
Time Period and Federal poverty level				
Months 0-6: Below 35% FPL	56.4%		29.5%	
Months 0-6: 36-99% FPL	56.7%	0.394	27.5%	< 0.01
Months 0-6: Above 100% FPL	57.3%	0.012	27.7%	< 0.01
Months 7-12: Below 35% FPL	43.4%	< 0.01	24.6%	< 0.01
Months 7-12: 36-99% FPL	43.4%	0.616	24.1%	< 0.01
Months 7-12: Above 100% FPL	43.7%	0.264	24.2%	< 0.01
Months 13-18: Below 35% FPL	46.0%	< 0.01	22.6%	< 0.01
Months 13-18: Above 36-99% FPL	46.6%	0.393	22.9%	< 0.01
Months 13-18: Above 100% FPL	46.6%	0.579	23.0%	< 0.01
Months 19-24: Below 35% FPL	36.6%	< 0.01	16.9%	< 0.01
Months 19-24: 36-99% FPL	35.9%	0.026	17.4%	< 0.01
Months 19-24: Above 100% FPL	34.4%	< 0.01	17.3%	< 0.01
Months 25-30: Below 35% FPL	34.7%	< 0.01	17.0%	< 0.01
Months 25-30: 36-99% FPL	31.7%	< 0.01	16.6%	< 0.01
Months 25-30: Above 100% FPL	29.4%	< 0.01	15.4%	0.510
Age				
Under 30	34.8%		17.3%	
30 to 39	37.5%	< 0.01	20.5%	< 0.01
40 to 49	46.8%	< 0.01	24.7%	< 0.01
Over 50	52.5%	< 0.01	25.5%	< 0.01
Gender				
Male	36.5%		19.4%	
Female	51.5%	< 0.01	25.6%	< 0.01
Race				
White	44.9%		24.1%	
Black	43.9%	< 0.01	20.0%	< 0.01
American Indian	46.9%	0.013	12.8%	< 0.01
Hispanic	45.6%	0.039	22.3%	< 0.01
Asian/Pacific Islander	46.7%	0.022	21.0%	< 0.01
Unknown	44.3%	0.016	21.1%	< 0.01
Region				
Upper Peninsula	37.6%	< 0.01	20.9%	< 0.01
Northwest	43.3%	< 0.01	22.0%	< 0.01
Northeast	42.1%	< 0.01	21.7%	< 0.01
West	44.1%	< 0.01	25.1%	< 0.01
East Central	44.1%	< 0.01	19.4%	< 0.01
East	46.4%	0.303	21.2%	< 0.01
South Central	41.1%	< 0.01	21.6%	< 0.01

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Southwest	41.6%	< 0.01	18.9%	< 0.01
Southeast	42.3%	< 0.01	23.6%	0.070
Detroit Metro	46.6%		24.0%	
Other health insurance				
No	44.8%		22.9%	
Yes	39.9%	< 0.01	16.9%	< 0.01
Total observations (Enrollee/periods)	681,530		681,530	

Table 3.1.3 Subset with Cost-Sharing Obligation: Predicted Copay Exempt and Copay Likely Service Use from Probit Regression Model on Repeated Cross-Sections of Enrollees

	Copay exempt service use	<i>p-value on regression coefficient</i>	Copay likely service use	<i>p-value on regression coefficient</i>
Collection category*				
None collected	43.8%		22.2%	
Partial collection	50.2%	< 0.001	27.1%	< 0.001
Full collection	52.2%	< 0.001	26.3%	< 0.001
Time period				
Months 0-6	60.5%		30.7%	
Months 7-12	46.5%	< 0.001	26.7%	< 0.001
Months 13-18	50.1%	< 0.001	25.0%	< 0.001
Months 19-24	38.2%	< 0.001	18.4%	< 0.001
Months 25-30	33.3%	< 0.001	17.1%	< 0.001
FPL				
0-35 %	49.2%		25.4%	
36-99 %	47.9%	< 0.001	25.1%	0.071
100+ %	45.5%	< 0.001	23.0%	< 0.001
Age				
Under 30	39.3%		20.1%	
30 to 39	40.4%	< 0.001	22.5%	< 0.001
40 to 49	49.3%	< 0.001	26.2%	< 0.001
Over 50	55.7%	< 0.001	27.3%	< 0.001
Gender				
Male	39.1%		21.3%	
Female	52.2%	< 0.001	26.4%	< 0.001
Race				
White	46.7%		25.4%	
Black	50.7%	< 0.001	22.6%	< 0.001
American Indian	51.7%	< 0.001	16.1%	< 0.001
Hispanic	48.8%	< 0.001	23.6%	< 0.001
Asian/Pacific Islander	50.7%	< 0.001	22.7%	0.004
Unknown	47.7%	0.001	22.9%	< 0.001
Region				
Upper Peninsula	40.1%	< 0.001	22.8%	< 0.001
Northwest	45.7%	< 0.001	24.5%	0.001
Northeast	44.3%	< 0.001	22.7%	< 0.001
West	46.7%	< 0.001	27.6%	< 0.001
East Central	46.8%	< 0.001	21.4%	< 0.001
East	48.8%	< 0.001	22.6%	< 0.001
South Central	44.6%	< 0.001	23.6%	< 0.001
Southwest	45.3%	< 0.001	21.2%	< 0.001

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Southeast	45.2%	< 0.001	25.7%	0.460
Detroit Metro	50.6%		25.9%	
Other health insurance				
No	47.9%		24.9%	
Yes	41.7%	< 0.001	18.1%	< 0.001
Total observations (Enrollee/periods)	347,172		347,172	

*Collection category based on aggregate collection over life in program through Q3 2016. Full collection = > 95% of invoice collected

Table 3.1.3a Subset with Cost-Sharing Obligation: Predicted Copay Exempt and Copay Likely Service Use from Probit Regression Model on Repeated Cross-Sections of Enrollees with Interaction of Above/Below 100% FPL and Time Period

	Copay exempt service use	<i>p-value on regression coefficient</i>	Copay likely service use	<i>p-value on regression coefficient</i>
Collection category				
None collected	43.7%		22.2%	
Partial collection	50.1%	< 0.001	27.1%	< 0.001
Full collection	52.2%	< 0.001	26.3%	< 0.001
Time period and Federal poverty level				
Months 0-6: Below 100% FPL	61.2%		31.6%	
Months 0-6: Above 100% FPL	58.5%	< 0.001	28.0%	< 0.001
Months 7-12: Below 100% FPL	47.2%	< 0.001	27.4%	< 0.001
Months 7-12: Above 100% FPL	44.2%	0.757	24.5%	0.425
Months 13-18: Below 100% FPL	50.8%	< 0.001	25.7%	< 0.001
Months 13-18: Above 100% FPL	47.7%	0.500	23.3%	0.055
Months 19-24: Below 100% FPL	39.3%	< 0.001	18.8%	< 0.001
Months 19-24: Above 100% FPL	35.1%	0.004	17.5%	0.001
Months 25-30: Below 100% FPL	34.6%	< 0.001	17.7%	< 0.001
Months 25-30: Above 100% FPL	29.8%	0.001	15.5%	0.580
Age				
Under 30	39.4%	< 0.001	20.1%	< 0.001
30 to 39	40.4%	< 0.001	22.5%	< 0.001
40 to 49	49.3%	< 0.001	26.2%	< 0.001
Over 50	55.6%	< 0.001	27.2%	< 0.001
Gender				
Male	39.0%		21.3%	
Female	52.2%	< 0.001	26.4%	< 0.001
Race				
White	46.6%	0.004	25.4%	< 0.001
Black	50.7%	< 0.001	22.5%	< 0.001
American Indian	51.6%	< 0.001	16.4%	< 0.001
Hispanic	48.6%	< 0.001	23.5%	< 0.001
Asian/Pacific Islander	50.9%	< 0.001	23.2%	0.022
Unknown	47.8%	< 0.001	22.9%	< 0.001
Region				
Upper Peninsula	40.0%	< 0.001	22.7%	< 0.001
Northwest	45.6%	< 0.001	24.6%	0.002
Northeast	44.1%	< 0.001	22.6%	< 0.001
West	46.7%	< 0.001	27.6%	< 0.001
East Central	46.7%	< 0.001	21.4%	< 0.001
East	48.8%	< 0.001	22.6%	< 0.001
South Central	44.6%	< 0.001	23.5%	< 0.001
Southwest	45.2%	< 0.001	21.1%	< 0.001
Southeast	45.2%	< 0.001	25.7%	0.470
Detroit Metro	50.5%	< 0.001	25.9%	< 0.001

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Other health insurance				
No	47.8%		24.8%	
Yes	41.8%	< 0.001	18.3%	< 0.001
Total observations (Enrollee/periods)	337,131		337,131	

*Collection category based on aggregate collection over life in program through Q3 2016. Full collection = > 95% of invoice collected

Table 3.1.4 Marginal Effects from Fixed Effects Regression of Service Use

	Copay exempt service use	<i>p-value on regression coefficient</i>	Copay likely service use	<i>p-value on regression coefficient</i>
Time period				
Months 0-6				
Months 7-12	-13.2%	< 0.001	-4.9%	< 0.001
Months 13-18	-10.3%	< 0.001	-7.0%	< 0.001
Months 19-24	-20.8%	< 0.001	-13.2%	< 0.001
Months 25-30	-27.1%	< 0.001	-16.8%	< 0.001
FPL				
0-35 %				
36-99 %	2.0%	0.029	3.7%	< 0.001
100+ %	2.8%	0.004	7.1%	< 0.001
Other health insurance				
No	-7.0%		-8.5%	
Yes	-1.5%	< 0.001	-6.2%	< 0.001
Total enrollees	681,789		681,789	

Note: The interpretation on these predictions is as the change in an individual's likelihood of service use compared with the baseline at Months 1-6, 0 to 35% of poverty and with no other health insurance. In this model, any unchanging characteristics of enrollees (gender or region, for example) are held constant.

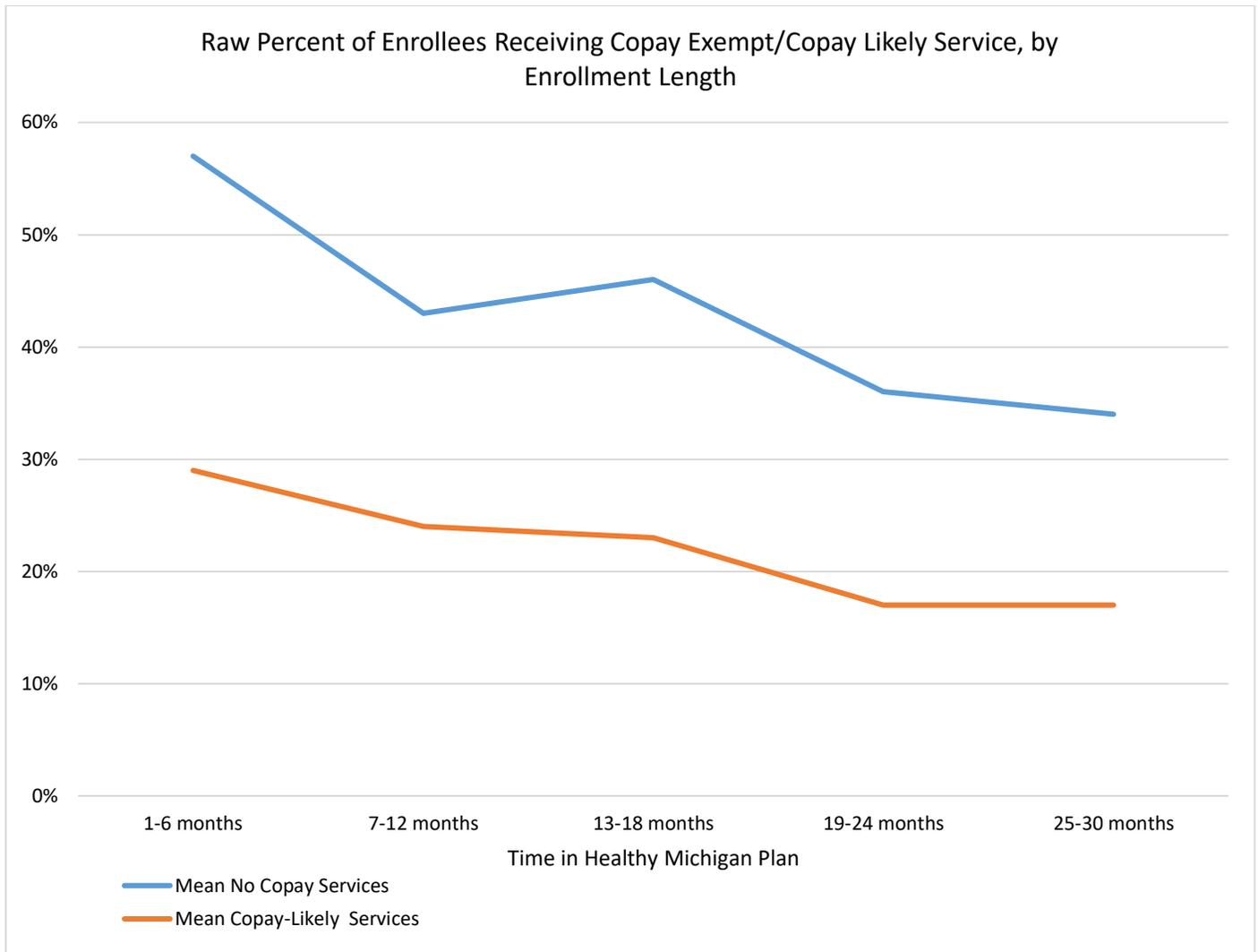
Table 3.1.4a Marginal Effects from Fixed Effects Regression on Log Spending

	Log spending on no copay	<i>p-value on regression coefficient</i>	Log spending on services with copay	<i>p-value on regression coefficient</i>
Time period				
Months 0-6				
Months 7-12	-0.48	< 0.01	-0.14	< 0.01
Months 13-18	-0.34	< 0.01	-0.19	< 0.01
Months 19-24	-0.63	< 0.01	-0.36	< 0.01
Months 25-30	-0.78	< 0.01	-0.44	< 0.01
FPL				
0-35 %		0.72		
36-99 %	0.06	0.07	0.13	< 0.01
100+ %	0.10	0.01	0.23	< 0.01
Other health insurance				
No				
Yes	-0.57	< 0.01	-0.16	< 0.01
Total enrollees	681,789		681,789	

Notes: 1) The log of healthcare expenditures are often used in research rather than the actual dollar amounts because many people spend very little each month and a few people spend quite a bit. That spread of spending, particularly when a few numbers are much higher than most, has been shown difficult to model mathematically. Instead, using the log of the number, results in more accurate predictions. In this case, the log spending was taken by adding \$1 to each spending outcome because the log of \$0 is undefined.

2) The interpretation on these predictions is as the change in an individual's likelihood of service use compared with the baseline at Months 1-6, 0 to 35% of poverty and with no other health insurance. In this model, any unchanging characteristics of enrollees (gender or region, for example) are held constant.

Figure 3.1.1 Average Percent of Enrollees Using No Copay/Copay-Likely Services Over Time



Hypothesis 2: Medicaid Service Value – Pharmaceuticals

Table 3.2.1 Predicted Use of Copay-Exempt and Copay-Likely Medications from a Cross-Sectional Probit Regression with Demographic Characteristics

	Predicted percent using copay exempt medications	<i>p-value on regression coefficient</i>	Predicted percent using copay likely medications	<i>p-value on regression coefficient</i>
FPL				
0-35 %	55.5%		2.4%	
36-99 %	50.9%	< 0.001	1.6%	< 0.001
100+ %	49.7%	< 0.001	1.4%	< 0.001
Age				
Under 30	26.4%		2.5%	
30 to 39	41.3%	< 0.001	2.5%	0.571
40 to 49	60.4%	< 0.001	2.1%	< 0.001
Over 50	70.4%	< 0.001	1.4%	< 0.001
Gender				
Male	51.1%		2.1%	
Female	55.3%	< 0.001	1.9%	0.017
Race				
White	53.4%		2.3%	
Black	54.1%	0.022	1.4%	< 0.001
American Indian	60.2%	< 0.001	0.8%	0.002
Hispanic	52.1%	0.074	1.7%	0.003
Asian/Pacific Islander	48.3%	0.002	2.1%	0.601
Unknown	50.7%	< 0.001	1.6%	< 0.001
Region				
Upper Peninsula	49.5%	< 0.001	2.8%	ref
Northwest	51.1%	0.004	2.3%	0.091
Northeast	52.7%	0.341	1.8%	< 0.001
West	53.9%	0.217	2.3%	0.035
East Central	55.3%	< 0.001	1.9%	< 0.001
East	54.4%	0.011	1.9%	< 0.001
South Central	50.0%	< 0.001	1.7%	< 0.001
Southwest	54.5%	0.027	2.2%	0.012
Southeast	52.7%	0.160	2.1%	0.006
Detroit Metro	53.4%	ref	1.9%	<0.001
Other health insurance				
No	53.2%		2.0%	
Yes	55.1%	< 0.001	2.9%	< 0.001
Total enrollees	158,322		158,322	

Table 3.2.2 Predicted Use of Copay Exempt and Copay-Likely Medications By Time Period from Probit Regression

	Copay exempt medication use	<i>p-value on regression coefficient</i>	Copay likely medication use	<i>p-value on regression coefficient</i>
Time period				
Months 0-6	39.8%		1.1%	
Months 7-12	41.7%	< 0.01	1.2%	< 0.01
Months 13-18	43.0%	< 0.01	1.1%	0.51
Months 19-24	41.9%	< 0.01	0.8%	< 0.01
Months 25-30	43.4%	< 0.01	0.5%	< 0.01
FPL				
0-35 %	43.4%		1.2%	
36-99 %	39.6%	< 0.01	0.8%	< 0.01
100+ %	39.2%	< 0.01	0.7%	< 0.01
Age				
Under 30	16.3%		1.2%	
30 to 39	27.7%	< 0.01	1.2%	0.70
40 to 49	46.7%	< 0.01	1.0%	< 0.01
Over 50	58.2%	< 0.01	0.7%	< 0.01
Gender				
Male	39.9%		1.0%	
Female	43.3%	< 0.01	0.9%	< 0.01
Race				
White	41.7%		1.1%	
Black	42.5%	< 0.01	0.7%	< 0.01
American Indian	46.9%	< 0.01	0.4%	< 0.01
Hispanic	41.0%	0.05	0.9%	< 0.01
Asian/Pacific Islander	39.6%	0.01	0.9%	0.24
Unknown	40.0%	< 0.01	0.7%	< 0.01
Region				
Upper Peninsula	38.5%	< 0.01	1.6%	< 0.01
Northwest	40.5%	0.02	1.3%	< 0.01
Northeast	41.2%	0.73	0.8%	0.48
West	43.3%	< 0.01	1.2%	< 0.01
East Central	44.2%	< 0.01	0.9%	0.48
East	42.5%	< 0.01	0.9%	0.68
South Central	38.8%	< 0.01	0.7%	0.09
Southwest	42.7%	< 0.01	1.1%	0.95
Southeast	41.4%	0.78	1.1%	0.02
Detroit Metro	41.4%		0.9%	
Other health insurance				
No	41.8%		1.0%	
Yes	42.0%	0.47	1.3%	< 0.01
Total observations (Enrollee/months)	666,582		666,582	

Table 3.2.2a Copay Exempt and Copay-Likely Medication Use, with Time and Above/Below 100% FPL Interaction, Predicted Effects from Probit Regression

	Copay exempt medication use	<i>p-value on regression coefficient</i>	Copay likely medication use	<i>p-value on regression coefficient</i>
Time period and Federal poverty level				
Months 0-6: Below 100% FPL	40.2%		1.1%	
Months 0-6: Above 100% FPL	36.8%	< 0.001	0.7%	< 0.001
Months 7-12: Below 100% FPL	42.1%	< 0.001	1.3%	0.007
Months 7-12: Above 100% FPL	38.6%	0.705	0.7%	0.788
Months 13-18: Below 100% FPL	43.4%	< 0.001	1.2%	0.595
Months 13-18: Above 100% FPL	39.9%	0.844	0.7%	0.544
Months 19-24: Below 100% FPL	42.4%	< 0.001	0.8%	< 0.001
Months 19-24: Above 100% FPL	38.6%	0.410	0.6%	0.039
Months 25-30: Below 100% FPL	44.1%	< 0.001	0.5%	< 0.001
Months 25-30: Above 100% FPL	39.4%	0.031	0.7%	< 0.001
Age				
Under 30	16.3%		1.2%	
30 to 39	27.6%	< 0.001	1.2%	0.825
40 to 49	46.8%	< 0.001	1.0%	< 0.001
Over 50	58.0%	< 0.001	0.7%	< 0.001
Gender				
Male	40.0%		1.1%	
Female	43.1%	< 0.001	0.9%	< 0.001
Race				
White	41.5%		1.1%	
Black	42.6%	< 0.001	0.7%	< 0.001
American Indian	46.8%	< 0.001	0.4%	< 0.001
Hispanic	40.5%	0.004	0.9%	0.001
Asian/Pacific Islander	38.9%	0.001	0.9%	0.142
Unknown	39.9%	< 0.001	0.7%	< 0.001
Region				
Upper Peninsula	38.1%	< 0.001	1.5%	< 0.001
Northwest	40.2%	0.003	1.2%	< 0.001
Northeast	40.8%	0.195	0.8%	0.394
West	43.2%	< 0.001	1.2%	< 0.001
East Central	44.0%	< 0.001	0.9%	0.472
East	42.3%	< 0.001	0.9%	0.855
South Central	38.6%	< 0.001	0.8%	0.046
Southwest	42.7%	< 0.001	1.1%	< 0.001
Southeast	41.3%	0.996	1.1%	< 0.001
Detroit Metro	41.3%		0.9%	
Other health insurance				
No	41.7%		1.0%	
Yes	41.5%	0.690	1.3%	< 0.001
Total observations (Enrollee/periods)	654,689		654,689	

Table 3.2.2b Predicted Spending on Copay Exempt Medications by Period, Predicted Monthly Spending from GLM Regression

	Copay exempt medications	<i>p-value on regression coefficient</i>
Time period		
Months 0-6	29.73	
Months 7-12	36.63	< 0.001
Months 13-18	41.41	< 0.001
Months 19-24	46.75	< 0.001
Months 25-30	54.52	< 0.001
FPL		
0-35 %	41.47	
36-99 %	36.97	< 0.001
100+ %	38.47	< 0.001
Age		
Under 30	19.27	
30 to 39	29.35	< 0.001
40 to 49	46.60	< 0.001
Over 50	50.92	< 0.001
Gender		
Male	48.94	
Female	32.40	< 0.001
Race		
White	36.34	
Black	51.00	< 0.001
American Indian	48.88	0.001
Hispanic	45.93	< 0.001
Asian/Pacific Islander	23.75	< 0.001
Unknown	32.95	< 0.001
Region		
Upper Peninsula	38.62	0.014
Northwest	37.92	0.018
Northeast	33.40	< 0.001
West	47.82	< 0.001
East Central	35.52	< 0.001
East	27.74	< 0.001
South Central	37.67	0.005
Southwest	42.40	0.530
Southeast	44.21	0.051
Detroit Metro	41.71	
Other health insurance		
No	39.98	
Yes	41.35	0.405
Total observations (Enrollee/periods)	666,582	

Notes: Copay-likely medications not included as regression specification was not possible due to computational traction (likely related to overall utilization and spending)

Table 3.2.3 Subset with Cost-Sharing Obligation: Average Medication Use by Time Period, Predictions from Probit Regression

	Copay exempt medication use	<i>p-value on regression coefficient</i>	Copay likely medication use	<i>p-value on regression coefficient</i>
Collection category*				
None collected	41.0%		0.9%	
Partial collection	43.1%	< 0.001	1.0%	0.003
Full collection	40.7%	0.160	0.8%	0.354
Time period				
Months 0-6	39.6%		0.9%	
Months 7-12	41.5%	< 0.001	0.9%	0.106
Months 13-18	42.8%	< 0.001	1.0%	0.019
Months 19-24	41.8%	< 0.001	0.9%	0.723
Months 25-30	42.5%	< 0.001	0.9%	0.892
FPL				
0-35 %	44.1%		1.2%	
36-99 %	41.1%	< 0.001	0.8%	< 0.001
100+ %	38.9%	< 0.001	0.7%	< 0.001
Age				
Under 30	15.9%		1.2%	
30 to 39	26.3%	< 0.001	1.1%	0.418
40 to 49	45.9%	< 0.001	0.9%	< 0.001
Over 50	60.7%	< 0.001	0.7%	< 0.001
Gender				
Male	41.6%		1.0%	
Female	41.5%	0.391	0.8%	< 0.001
Race				
White	40.7%		1.0%	
Black	45.4%	< 0.001	0.7%	< 0.001
American Indian	46.4%	< 0.001	0.6%	0.085
Hispanic	41.0%	0.569	0.8%	0.147
Asian/Pacific Islander	41.4%	0.496	0.9%	0.821
Unknown	39.9%	0.010	0.7%	< 0.001
Region				
Upper Peninsula	38.7%	< 0.001	1.6%	< 0.001
Northwest	39.6%	< 0.001	1.5%	< 0.001
Northeast	40.4%	0.006	0.7%	0.892
West	42.6%	< 0.001	1.1%	< 0.001
East Central	43.2%	< 0.001	0.9%	0.006
East	41.8%	0.321	0.8%	0.922
South Central	39.1%	< 0.001	0.7%	0.521
Southwest	43.2%	< 0.001	1.0%	< 0.001

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Southeast	40.7%	0.007	0.9%	0.002
Detroit Metro	41.6%		0.7%	
Other health insurance				
No	41.6%		0.9%	
Yes	40.8%	0.041	1.2%	0.001
Total observations (Enrollee/period)	340,254		340,254	

*Collection category based on aggregate collection over life in program through Q3 2016. Full collection = > 95% of invoice collected

Table 3.2.3a Subset with Cost-Sharing Obligation: Average Medication Use, Predictions from Probit Regression with Interaction between Above/Below 100% FPL and Time Period

	Copay exempt medication use	<i>p</i>-value on regression coefficient	Copay likely medication use	<i>p</i>-value on regression coefficient
Collection category*				
None collected	40.8%		0.9%	
Partial collection	42.9%	< 0.001	1.0%	0.003
Full collection	40.5%	0.225	0.8%	0.389
Time period and Federal poverty level				
Months 0-6: Below 100% FPL	40.3%		0.9%	
Months 0-6: Above 100% FPL	36.6%	< 0.001	0.7%	< 0.001
Months 7-12: Below 100% FPL	42.4%	< 0.001	1.0%	0.100
Months 7-12: Above 100% FPL	38.2%	0.586	0.7%	0.784
Months 13-18: Below 100% FPL	43.7%	< 0.001	1.1%	0.017
Months 13-18: Above 100% FPL	39.5%	0.558	0.7%	0.682
Months 19-24: Below 100% FPL	42.7%	< 0.001	0.9%	0.864
Months 19-24: Above 100% FPL	38.5%	0.502	0.6%	0.493
Months 25-30: Below 100% FPL	43.6%	< 0.001	0.9%	0.917
Months 25-30: Above 100% FPL	39.0%	0.309	0.7%	0.636
Age				
Under 30	15.9%		1.2%	
30 to 39	26.3%	< 0.001	1.1%	0.188
40 to 49	45.9%	< 0.001	0.9%	< 0.001
Over 50	60.4%	< 0.001	0.7%	< 0.001
Gender				
Male	41.4%		1.0%	
Female	41.3%	0.592	0.8%	< 0.001
Race				
White	40.4%		1.0%	
Black	45.4%	< 0.001	0.7%	< 0.001
American Indian	46.4%	< 0.001	0.6%	0.116
Hispanic	40.3%	0.739	0.8%	0.062
Asian/Pacific Islander	40.7%	0.804	0.8%	0.555
Unknown	39.7%	0.026	0.7%	< 0.001
Region				
Upper Peninsula	38.5%	< 0.001	1.6%	< 0.001
Northwest	39.4%	< 0.001	1.4%	< 0.001
Northeast	40.0%	0.002	0.7%	0.978
West	42.5%	< 0.001	1.1%	< 0.001
East Central	42.8%	< 0.001	0.9%	0.002
East	41.5%	0.412	0.8%	0.750
South Central	38.8%	< 0.001	0.7%	0.893

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Southwest	43.1%	< 0.001	1.0%	< 0.001
Southeast	40.4%	0.007	1.0%	< 0.001
Detroit Metro	41.3%		0.7%	
Other health insurance				
No	41.3%		0.9%	
Yes	40.3%	0.021	1.2%	< 0.001
Total observations (Enrollee/periods)	330,382		330,382	

Notes: Collection category based on aggregate collection over life in program through Q3 2016. Full collection = > 95% of invoice collected

Table 3.2.3b Predicted Use of Copay Exempt and Copay Likely Medications from Probit Regression with Interactions on Time Period and FPL

	Copay exempt medication use	<i>p-value on regression coefficient</i>	Copay likely medication use	<i>p-value on regression coefficient</i>
Time period and Federal poverty level				
Months 0-6: Below 35% FPL	41.3%		1.3%	
Months 0-6: 36-99% FPL	37.7%	< 0.001	0.8%	< 0.001
Months 0-6: Above 100% FPL	37.6%	< 0.001	0.7%	< 0.001
Months 7-12: Below 35% FPL	43.3%	< 0.001	1.4%	0.038
Months 7-12: 36-99% FPL	39.5%	0.674	0.9%	0.690
Months 7-12: Above 100% FPL	39.4%	0.707	0.8%	0.762
Months 13-18: Below 35% FPL	44.6%	< 0.001	1.3%	0.926
Months 13-18: Above 36-99% FPL	40.7%	0.528	0.9%	0.275
Months 13-18: Above 100% FPL	40.5%	0.356	0.7%	0.660
Months 19-24: Below 35% FPL	43.6%	< 0.001	0.9%	< 0.001
Months 19-24: 36-99% FPL	39.8%	0.543	0.8%	< 0.001
Months 19-24: Above 100% FPL	38.9%	0.038	0.6%	0.004
Months 25-30: Below 35% FPL	45.5%	< 0.001	0.4%	< 0.001
Months 25-30: 36-99% FPL	40.8%	0.041	0.7%	< 0.001
Months 25-30: Above 100% FPL	39.5%	0.001	0.6%	< 0.001
Age				
Under 30	16.3%	< 0.001	1.2%	0.141
30 to 39	27.7%	< 0.001	1.2%	0.699
40 to 49	46.7%	< 0.001	1.0%	< 0.001
Over 50	58.2%	< 0.001	0.7%	
Gender				
Male	39.9%		1.0%	
Female	43.3%	< 0.001	0.9%	< 0.001
Race				
White	41.7%		1.1%	
Black	42.5%	< 0.001	0.7%	< 0.001
American Indian	46.9%	< 0.001	0.4%	< 0.001
Hispanic	41.0%	0.048	0.9%	0.004
Asian/Pacific Islander	39.6%	0.006	0.9%	0.247
Unknown	40.0%	< 0.001	0.7%	< 0.001
Region				
Upper Peninsula	38.5%	< 0.001	1.6%	< 0.001
Northwest	40.5%	0.017	1.3%	< 0.001
Northeast	41.2%	0.738	0.8%	0.466
West	43.3%	< 0.001	1.2%	< 0.001
East Central	44.2%	< 0.001	0.9%	0.487
East	42.5%	< 0.001	0.9%	0.963
South Central	38.8%	< 0.001	0.7%	0.022
Southwest	42.7%	< 0.001	1.1%	< 0.001
Southeast	41.4%	0.774	1.0%	< 0.001
Detroit Metro	41.4%		0.9%	

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Other health insurance				
No	41.8%		1.0%	
Yes	42.0%	0.508	1.4%	< 0.001
Total observations (Enrollee/periods)	666,582		666,582	

Table 3.2.4a Marginal Effects of Time and FPL from Fixed Effects Regression of Medication Use

	Copay exempt medications	<i>p-value on regression coefficient</i>	Copay likely medications	<i>p-value on regression coefficient</i>
Time period				
Months 0-6				
Months 7-12	1.9%	< 0.001	0.08%	< 0.001
Months 13-18	3.2%	< 0.001	-0.02%	0.474
Months 19-24	1.9%	< 0.001	-0.36%	< 0.001
Months 25-30	1.3%	< 0.001	-0.82%	< 0.001
FPL				
0-35 %				
36-99 %	0.5%	0.438	-0.15%	0.413
100+ %	0.7%	0.267	-0.47%	0.004
Other health insurance				
No				
Yes	-2.8%	< 0.001	-0.12%	0.254
Total enrollees	158,366		158,366	

Notes: The interpretation on these predictions is as the change in an individual’s likelihood of service use compared with the baseline at Months 1-6, 0 to 35% of poverty and with no other health insurance. In this model, any unchanging characteristics of enrollees (gender or region, for example) are held constant.

Table 3.2.4b Fixed Effects Regression of Spending

	Change in log spending on copay exempt medications	<i>p-value on regression coefficient</i>	Change in log spending on copay likely medications	<i>p-value on regression coefficient</i>
Time period				
Months 0-6				
Months 7-12	0.10	< 0.01	0.07	< 0.01
Months 13-18	0.17	< 0.01	0.13	< 0.01
Months 19-24	0.18	< 0.01	0.13	< 0.01
Months 25-30	0.20	< 0.01	0.13	< 0.01
FPL				
0-35 %				
36-99 %	0.02	0.48	0.00	0.96
100+ %	-0.02	0.38	-0.02	0.38
Other health insurance				
No				
Yes	-0.10	< 0.01	-0.04	< 0.01
Total enrollees	158,366		158,366	

Notes: 1) The log of healthcare expenditures are often used in research rather than the actual dollar amounts because many people spend very little each month and a few people spend quite a bit. That spread of spending, particularly when a few numbers are much higher than most, has been shown difficult to model mathematically. Instead, using the log of the number, results in more accurate predictions. In this case, the log spending was taken by adding \$1 to each spending outcome because the log of \$0 is undefined.

2) The interpretation on these predictions is as the change in an individual's likelihood of service use compared with the baseline at Months 1-6, 0 to 35% of poverty and with no other health insurance. In this model, any unchanging characteristics of enrollees (gender or region, for example) are held constant.

Figure 3.2.1 Percent of the Population Receiving a High- or Copay- likely Medication

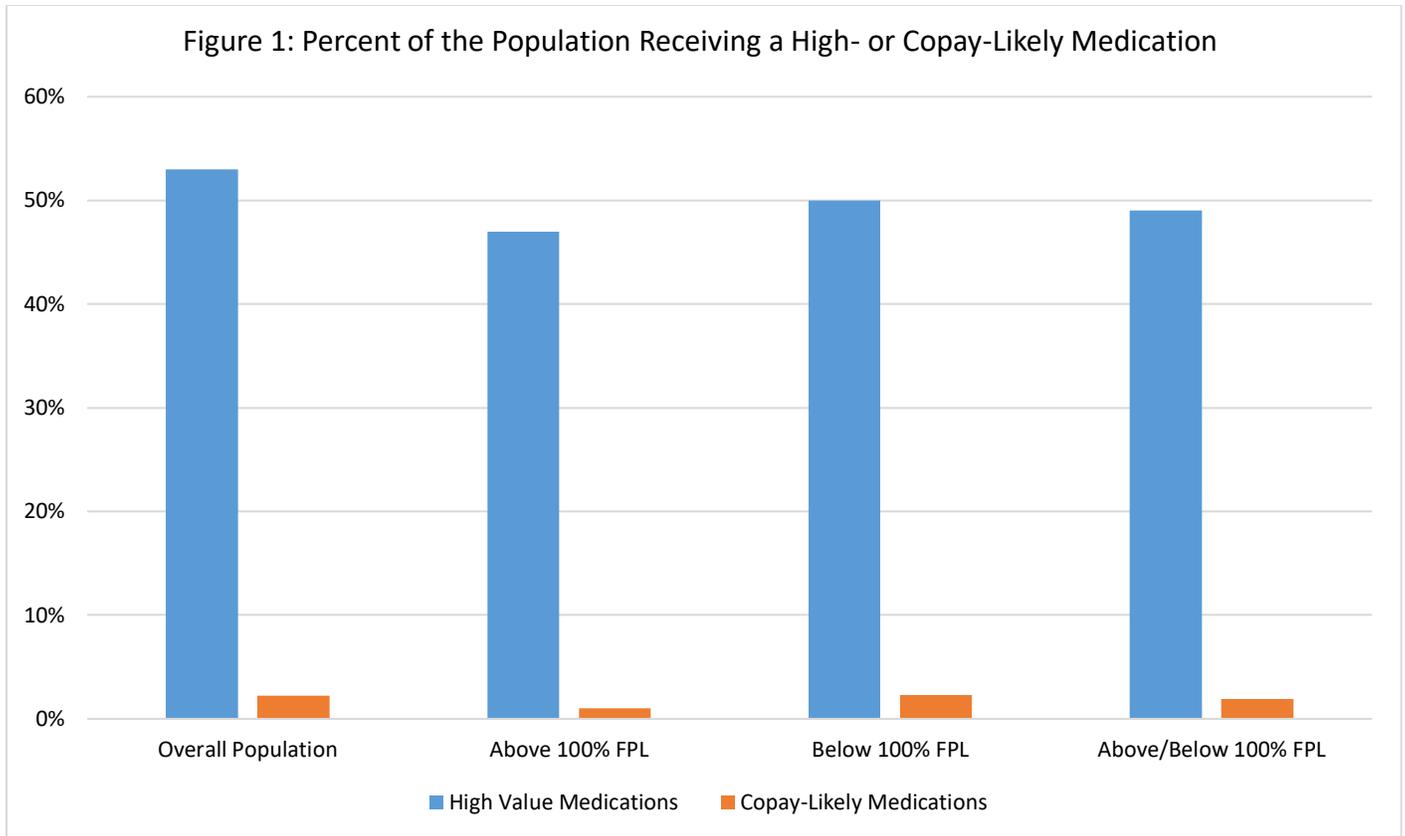
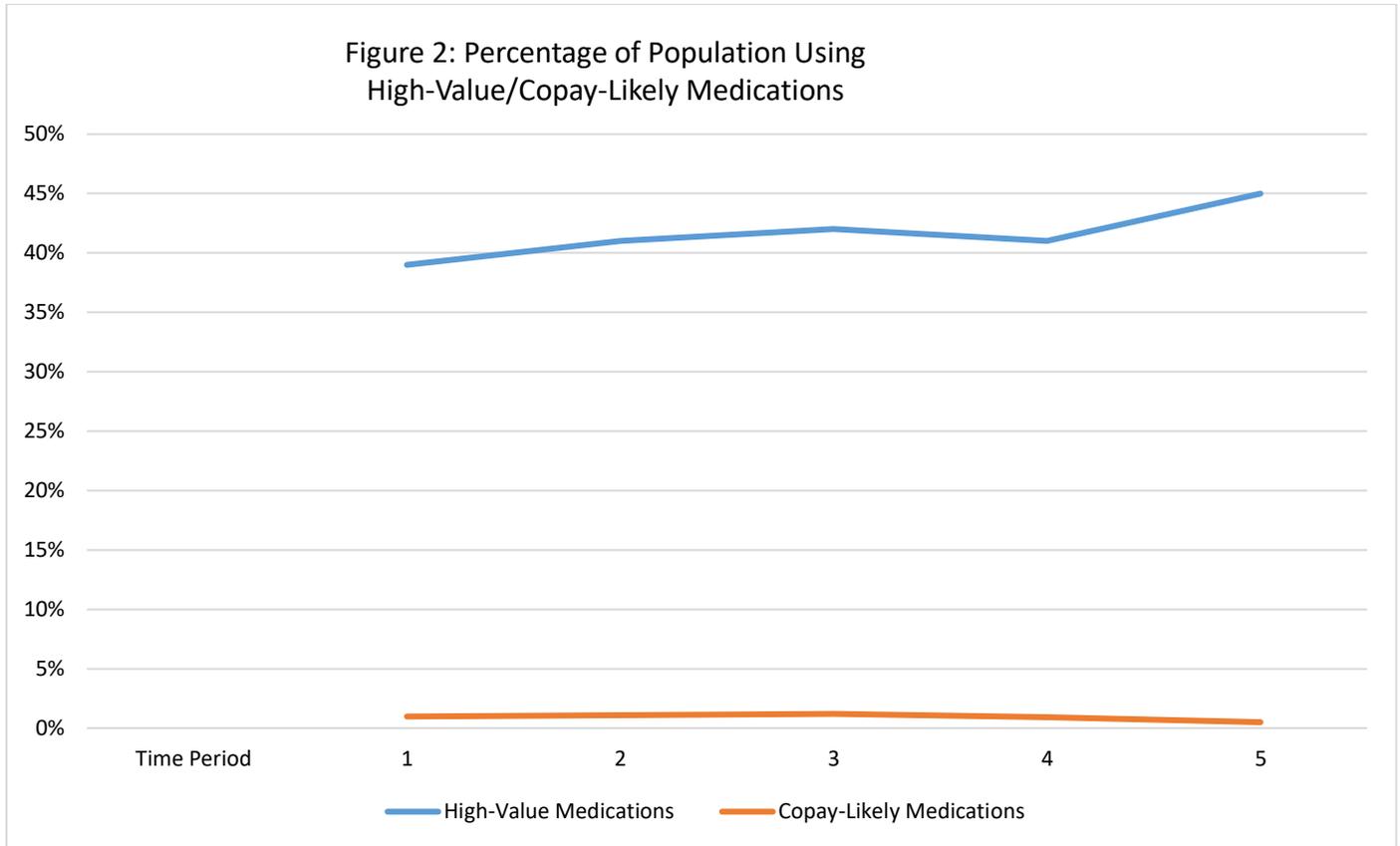


Figure 3.2.2 Percentage of Population Using High-Value/Copay-Likely Medications



Hypothesis 2: Medicaid Service Value – Emergency Department (ED) Use

Table 3.3.1 Number of ED Visits and Likelihood of Copay

	ED type A		ED type B	
	Percent of visits with copay	Total visits	Percent of visits with copay	Total visits
Visit severity				
High	0.01%	209,528	9.76%	1,486
Medium	0.06%	124,082	14.65%	3,645
Low	0.33%	32,264	52.19%	1,667
Total	0.05%	365,874	22.8%	6,798

Table 3.3.2 Predicted Likelihood of Copayment by ED Type and Severity from Probit Regression of Enrollee Month that Includes ED Claim

	No time period effects		Time period effects	
	Copay flag	<i>p-value on regression coefficient</i>	Copay flag	<i>p-value on regression coefficient</i>
Visit severity				
Low	7.8%	< 0.001	7.8%	< 0.001
Medium	0.5%	0.877	0.5%	0.905
High	0.5%		0.5%	
Emergency room type				
24/7 Hospital affiliated (type A)	0.1%		0.1%	
Urgent Care associated with hospital (type B)	22.2%	< 0.001	22.2%	< 0.001
Time period				
Months 0-6			0.8%	
Months 7-12			0.7%	0.328
Months 13-18			0.7%	0.902
Months 19-24			0.7%	0.046
Months 25-30			0.8%	0.584
Total enrollee months with ED claims	229,246		229,246	

Regression level is enrollee/months and this regression is limited to months in which there is an ED claim. So, interpretation is tricky but close to visit level, i.e. 6.2% low severity visits incur a copay, controlling for other things.

Table 3.3.3 Predicted Emergency Department Use over Time from Probit Regression on whether Enrollee had at least one claim in a month

	Predicted total ED use	<i>p-value on regression coefficient</i>	Type A visits	<i>p-value on regression coefficient</i>	Type B visits	<i>p-value on regression coefficient</i>
Time period						
Months 0-6	25.5%		25.2%		1.0%	
Months 7-12	25.0%	0.001	24.7%	0.001	0.9%	0.563
Months 13-18	25.0%	< 0.001	24.6%	< 0.001	0.8%	< 0.001
Months 19-24	19.9%	< 0.001	19.7%	< 0.001	0.5%	< 0.001
Months 25-30	17.3%	< 0.001	17.0%	< 0.001	0.3%	< 0.001
Age						
Under 30	26.8%		26.3%		1.1%	
30 to 39	25.9%	< 0.001	25.4%	< 0.001	0.9%	< 0.001
40 to 49	25.0%	< 0.001	24.6%	< 0.001	0.8%	< 0.001
Over 50	18.9%	< 0.001	18.7%	< 0.001	0.5%	< 0.001
Gender						
Male	21.1%		20.9%		0.6%	
Female	25.2%	< 0.001	24.8%	< 0.001	0.9%	< 0.001
Race						
White	21.6%		21.2%		0.7%	
Black	28.9%	< 0.001	28.7%	< 0.001	1.1%	< 0.001
American Indian	25.6%	< 0.001	25.2%	< 0.001	0.8%	0.267
Hispanic	24.0%	< 0.001	23.6%	< 0.001	0.6%	0.741
Asian/Pacific Islander	12.6%	< 0.001	12.4%	< 0.001	0.3%	0.003
Unknown	20.3%	< 0.001	20.1%	< 0.001	0.6%	0.047
FPL						
0-35 %	25.6%		25.3%		0.8%	
36-99 %	20.6%	< 0.001	20.2%	< 0.001	0.7%	< 0.001
100+ %	19.5%	< 0.001	19.1%	< 0.001	0.8%	0.026
Region						
Upper Peninsula	22.9%	0.224	22.9%	0.013	0.0%	< 0.001
Northwest	22.1%	0.170	20.1%	< 0.001	3.1%	< 0.001
Northeast	20.8%	< 0.001	20.8%	< 0.001	0.1%	< 0.001
West	27.4%	< 0.001	26.1%	< 0.001	2.2%	< 0.001
East Central	24.2%	< 0.001	24.2%	< 0.001	0.0%	< 0.001
East	20.4%	< 0.001	20.2%	< 0.001	0.3%	< 0.001
South Central	21.5%	< 0.001	21.5%	0.007	0.0%	< 0.001
Southwest	27.0%	< 0.001	27.0%	< 0.001	0.0%	< 0.001
Southeast	25.2%	< 0.001	25.3%	< 0.001	0.0%	< 0.001
Detroit Metro	22.5%		22.2%		0.9%	

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Other health insurance						
No	0.8%		23.1%		25.2%	
Yes	0.7%	< 0.001	20.6%	< 0.001	16.8%	0.115
Total observations (Person/period)	681,697		681,697		681,697	

Table 3.3.3a Predicted Average Monthly Spending on Emergency Department Visits, over time using GLM Regression Models

	Spending on all ED visits	<i>p-value on regression coefficient</i>	Spending on ED type A visits	<i>p-value on regression coefficient</i>	Spending on ED type B visits	<i>p-value on regression coefficient</i>
Time period						
Months 0-6	21.93		21.74		0.20	
Months 7-12	22.84	0.002	22.64	0.002	0.20	0.573
Months 13-18	22.95	< 0.001	22.77	< 0.001	0.17	0.072
Months 19-24	21.29	0.041	21.17	0.073	0.12	< 0.001
Months 25-30	20.72	0.003	20.63	0.007	0.10	< 0.001
Age						
Under 30	24.04		23.79		0.25	
30 to 39	24.58	0.090	24.39	0.061	0.19	< 0.001
40 to 49	24.78	0.026	24.60	0.014	0.17	< 0.001
Over 50	17.76	< 0.001	17.65	< 0.001	0.11	< 0.001
Gender						
Male	18.62		18.49		0.12	
Female	25.07	< 0.001	24.86	< 0.001	0.21	< 0.001
Race						
White	21.41		21.26		0.15	
Black	25.00	< 0.001	24.77	< 0.001	0.24	< 0.001
American Indian	26.94	0.001	26.77	0.001	0.17	0.584
Hispanic	22.61	0.048	22.46	0.048	0.15	0.887
Asian/Pacific Islander	10.80	< 0.001	10.75	< 0.001	0.05	< 0.001
Unknown	19.34	< 0.001	19.22	< 0.001	0.13	0.103
FPL						
0-35 %	25.38		25.20		0.18	
36-99 %	18.07	< 0.001	17.93	< 0.001	0.14	< 0.001
100+ %	16.61	< 0.001	16.43	< 0.001	0.18	0.981
Region						
Upper Peninsula	18.22	< 0.001	18.19	< 0.001	0.03	< 0.001
Northwest	20.92	0.343	20.20	0.065	0.72	< 0.001
Northeast	17.95	< 0.001	17.88	< 0.001	0.07	< 0.001
West	25.28	< 0.001	24.82	< 0.001	0.46	< 0.001
East Central	22.47	0.017	22.46	0.005	0.02	< 0.001
East	20.33	0.001	20.26	0.004	0.07	< 0.001
South Central	21.20	0.553	21.19	0.811	0.01	< 0.001
Southwest	25.89	< 0.001	25.88	< 0.001	0.01	< 0.001
Southeast	24.49	< 0.001	24.47	< 0.001	0.01	< 0.001
Detroit Metro	21.50		21.31		0.19	
Other health insurance						
No	22.17		22.00		0.17	
Yes	20.98	0.201	20.81		0.17	0.821
Total observations (Person/period)	681,697		681,697		681,697	

Table 3.3.3b Average Severity of Visit; Marginal Effects from Linear Regression and Probit Model

	Linear regression	<i>p-value on regression coefficient</i>	Probit (Prob medium or high severity visit)	<i>p-value on regression coefficient</i>
Time period				
Months 0-6	ref		ref	
Months 7-12	-0.002	0.403	-0.002	0.35
Months 13-18	0.004	0.068	0.003	0.07
Months 19-24	0.108	< 0.01	0.081	< 0.01
Months 25-30	0.184	< 0.01	0.137	< 0.01
Age				
Under 30	ref		ref	
30 to 39	0.004	0.055	0.003	0.01
40 to 49	-0.012	< 0.01	-0.009	< 0.01
Over 50	-0.036	< 0.01	-0.029	< 0.01
Gender				
Male	ref		ref	
Female	0.024	< 0.01	0.019	< 0.01
Race				
White	ref		ref	
Black	-0.007	0.001	-0.004	0.02
American Indian	0.009	0.424	0.011	0.25
Hispanic	-0.002	0.666	-0.002	0.70
Asian/Pacific Islander	-0.029		-0.036	
Unknown	0.003	0.380	0.001	0.65
FPL				
0-35 %	ref		ref	
36-99 %	-0.034	< 0.01	-0.028	< 0.01
100+ %	-0.041	< 0.01	-0.033	< 0.01
Region				
Upper Peninsula	-0.016	0.001	-0.013	< 0.01
Northwest	-0.004	0.455	-0.002	0.72
Northeast	-0.022	< 0.01	-0.016	< 0.01
West	0.010	< 0.01	0.012	< 0.01
East Central	0.012	0.001	0.013	< 0.01
East	0.007	0.035	0.005	0.04
South Central	0.022	< 0.01	0.018	< 0.01
Southwest	0.012	0.001	0.010	< 0.01
Southeast	0.015	< 0.01	0.014	< 0.01
Detroit Metro	ref		ref	
Other health insurance				
No	ref		ref	
Yes	0.008	0.160	0.005	0.19
ED type B visit				
No	ref		ref	
Yes	0.002	0.739	0.002	0.55

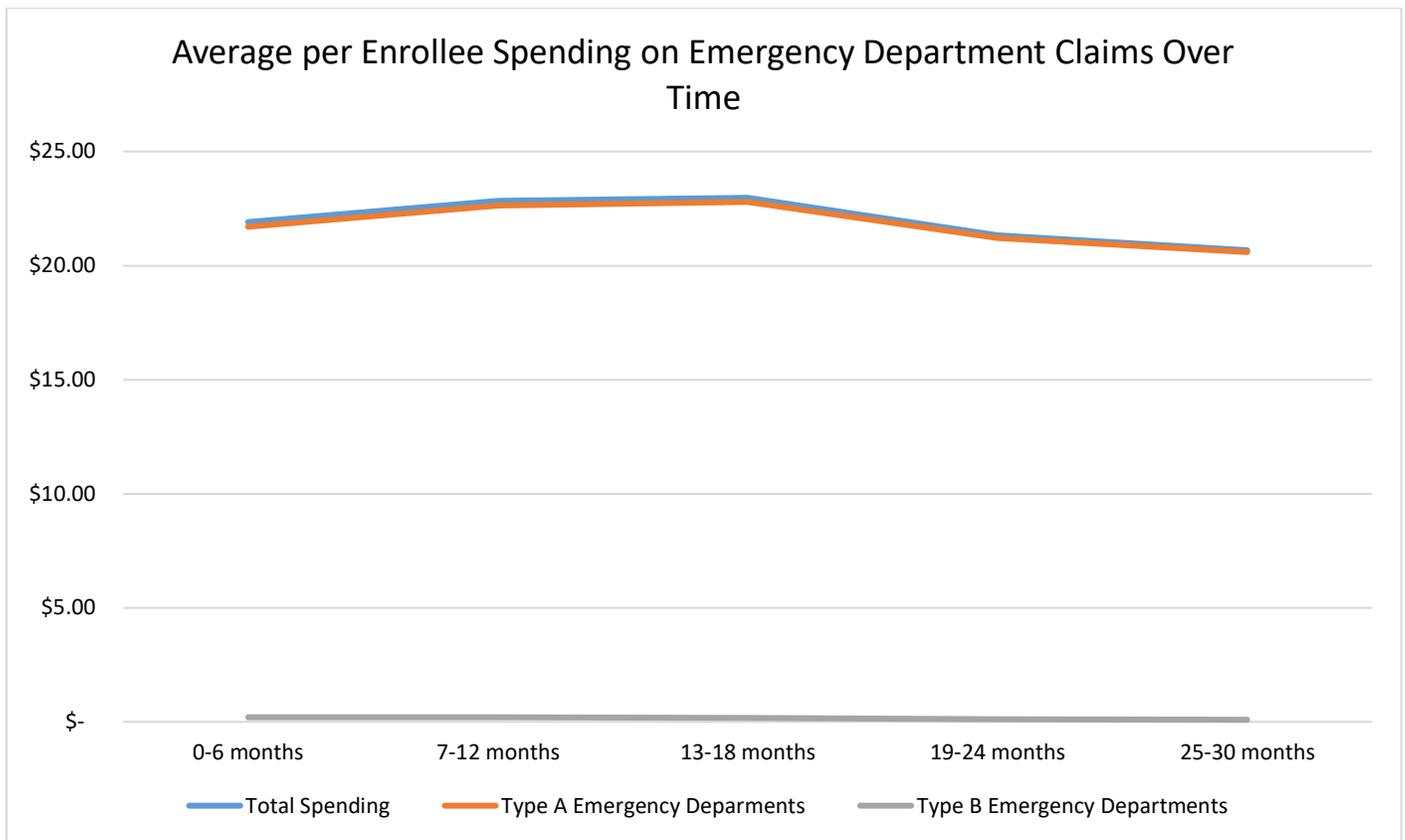
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Constant	1.080			
Total observations (Person/period)	159,170		159,170	

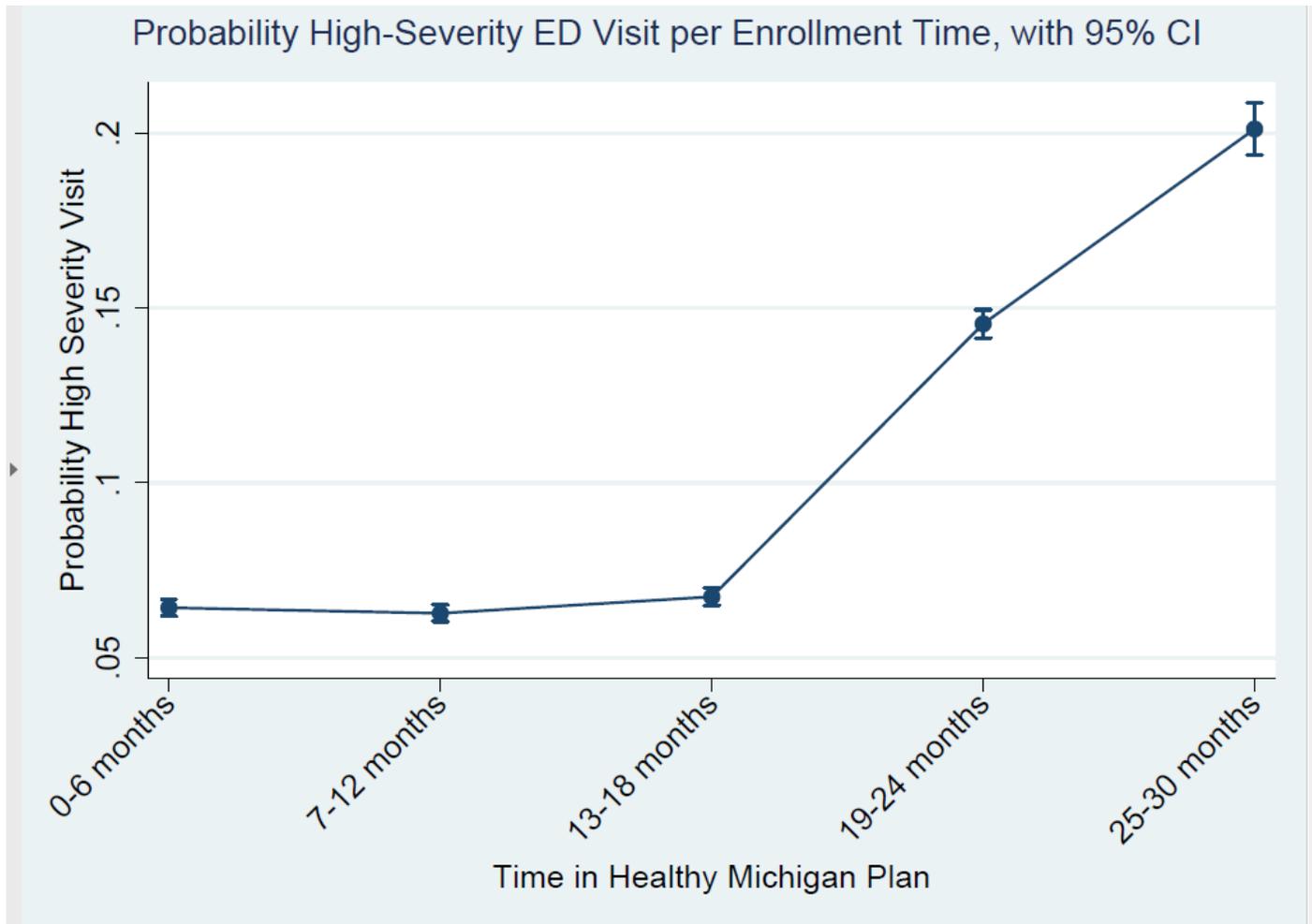
Ordinal logit was tried but no specification was tractable, likely due to low number of high/medium visits compared to low severity. Low severity > 90% of visits

Figure 3.3.1 Average per Enrollee Spending on Emergency Department Claims Over Time



	0-6 months	7-12 months	13-18 months	19-24 months	25-30 months
Total spending	\$ 21.90	\$ 22.83	\$ 22.97	\$ 21.33	\$ 20.67
Type A emergency departments	\$ 21.71	\$ 22.62	\$ 22.79	\$ 21.21	\$ 20.59
Type B emergency departments	\$ 0.20	\$ 0.20	\$ 0.18	\$ 0.12	\$ 0.09

Figure 3.3.2 Probability of Medium/High Severity Visit



Note: Margins from a probit regression of probability of medium or high severity visit on time period, type of ED visit and same set of demographic characteristics as above. All periods are significantly different from baseline except for period 2 (7-12 months).

The hypothesis being tested is whether ED severity goes up over time, a possible indication that lower severity issues are being dealt with in other settings. This graph shows predictive margins from a probit regression of the probability of a visit coded as medium or high severity, conditional on an ED visit.

Hypothesis 3: Disenrollment Analyses

Table 4.1 Demographics of those Without Insurance Compared with Those with Insurance, Post HMP-enrollment, Unadjusted analysis

	Uninsured since HMP	Insured since HMP	<i>p-value on regression coefficient from adjusted Wald test of difference in proportions</i>
Age			
Under 30	41.2%	44.6%	0.416
30 to 39	19.7%	17.2%	0.443
40 to 49	19.4%	19.2%	0.952
Over 50	19.7%	19.0%	0.817
Gender			
Male			
Female	34.2%	44.2%	< 0.019
Race			
White	55.2%	58.5%	0.429
Black	21.6%	23.2%	0.672
American Indian	0.9%	0.6%	0.586
Hispanic	4.2%	3.0%	
Asian/Pacific Islander	0.7%	0.8%	0.872
Unknown	17.3%	13.9%	0.278
FPL			
0-35 %	63.6%	60.1%	0.326
36-99 %	23.2%	23.2%	0.996
100+ %	13.2%	16.7%	0.101
Region			
Upper Peninsula	3.1%	3.0%	0.923
Northwest	3.3%	3.3%	0.969
Northeast	1.7%	2.3%	0.294
West	8.3%	12.3%	0.079
East Central	5.0%	7.5%	0.137
East	11.5%	9.7%	0.458
South Central	3.7%	4.5%	0.629
Southwest	7.9%	7.3%	0.773
Southeast	10.9%	7.9%	0.224
Detroit Metro	44.8%	42.2%	0.534
Total enrollees	373	687	

Table 4.2 Predicted Percentage of Insurance Post-HMP from No Longer Enrolled Survey from Probit Regression

	Predicted percent with insurance including average quarterly invoice	<i>p-value on regression coefficient</i>	Predicted percent with insurance including flag for cost obligation	<i>p-value on regression coefficient</i>	Subset with cost obligation: predicted percent with insurance including compliance with obligation	<i>p-value on regression coefficient</i>
Age						
Under 30	64.1%		63.8%		73.2%	
30 to 39	58.7%	0.323	58.8%	0.355	70.1%	0.726
40 to 49	61.5%	0.621	61.8%	0.689	68.4%	0.562
Over 50	57.9%	0.209	58.1%	0.249	57.0%	0.026
Gender						
Male	57.8%		57.9%		67.4%	
Female	66.9%	0.018	66.8%	0.020	68.8%	0.814
Race						
White	62.4%		62.3%		65.1%	
Black	63.9%	0.786	64.0%	0.760	70.9%	0.492
American Indian	48.6%	0.505	48.0%	0.492		
Hispanic	50.1%	0.247	50.6%	0.272	91.1%	0.061
Asian/Pacific Islander	60.5%	0.923	57.9%	0.809	84.7%	0.417
Unknown	57.6%	0.395	57.5%	0.394	73.1%	0.306
FPL						
0-35 %	62.1%		62.6%		77.7%	
36-99 %	57.2%	0.247	58.9%	0.377	64.2%	0.135
100+ %	65.0%	0.598	60.6%	0.683	63.6%	0.106
Region						
Upper Peninsula	61.3%	0.890	59.8%	0.961	62.8%	0.534
Northwest	61.4%	0.870	61.6%	0.844	73.4%	0.815
Northeast	67.7%	0.376	68.3%	0.331	82.9%	0.305
West	71.3%	0.081	71.6%	0.074	80.7%	0.347
East Central	70.3%	0.185	70.5%	0.173	63.0%	0.587
East	55.9%	0.503	56.2%	0.539	67.7%	0.755
South Central	66.5%	0.547	65.8%	0.602	62.8%	0.702
Southwest	57.6%	0.746	57.3%	0.721	58.4%	0.356
Southeast	55.2%	0.500	55.3%	0.511	62.4%	0.486
Detroit Metro	60.2%		60.1%		70.7%	

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Category of Average Invoice						
\$0	58.5%					
\$0.01 - \$15	75.2%	< 0.01				
\$15.01 +	62.0%	0.569				
Cost Obligation						
No			58.1%			
Yes			69.9%	< 0.014		
Collection category						
None collected					57.5%	
Partial collection					73.0%	0.062
Full collection					84.3%	< 0.01
Total enrollees	1,060		1,060		314	

Adjusted by survey weights and stratum. Results are predicted prevalence of each category, controlling for other covariates in the model

Table 4.3 Predicted Likelihood of Disenrollment in Period

	Cost obligation in prior period	<i>p-value on regression coefficient</i>	Invoice amount in prior period	<i>p-value on regression coefficient</i>	Invoice amount in prior period (quadratic specification for invoice)	<i>p-value on regression coefficient</i>	Invoice amount in prior period (quadratic specification with interactions on above/below 100% FPL)	<i>p-value on regression coefficient</i>
FPL								
0-35 %	14.3%		14.5%		14.4%			
36-99 %	12.7%	0.000	11.8%	0.000	11.9%	0.000		
100+ %	16.0%	0.000	16.9%	0.000	17.2%	0.000		
Age								
Under 30	20.3%		20.6%		20.6%		20.4%	
30 to 39	14.6%	0.000	14.7%	0.000	14.7%	0.000	14.6%	0.000
40 to 49	12.1%	0.000	12.1%	0.000	12.1%	0.000	12.1%	0.000
Over 50	10.8%	0.000	10.7%	0.000	10.7%	0.000	10.8%	0.000
Gender								
Male	17.0%		17.2%		17.1%		17.1%	
Female	11.5%	0.000	11.4%	0.000	11.4%	0.000	11.4%	0.000
Race								
White	13.2%		13.1%		13.2%		13.1%	
Black	13.3%	0.281	13.4%	0.009	13.4%	0.027	13.4%	0.002
American Indian	15.3%	0.000	15.8%	0.000	15.8%	0.000	15.7%	0.000
Hispanic	15.0%	0.000	15.0%	0.000	15.0%	0.000	15.0%	0.000
Asian/Pacific Islander	17.1%	0.000	17.1%	0.000	17.1%	0.000	16.8%	0.000
Unknown	22.2%	0.000	22.4%	0.000	22.4%	0.000	22.2%	0.000
Region								
Upper Peninsula	13.1%	0.000	12.9%	0.000	13.0%	0.000	12.9%	0.000
Northwest	15.2%	0.001	15.1%	0.000	15.1%	0.000	15.1%	0.000
Northeast	12.5%	0.000	12.4%	0.000	12.4%	0.000	12.5%	0.000
West	14.7%	0.000	14.7%	0.000	14.7%	0.000	14.7%	0.000
East Central	13.0%	0.000	12.9%	0.000	12.9%	0.000	12.9%	0.000
East	13.6%	0.000	13.5%	0.000	13.5%	0.000	13.6%	0.000
South Central	15.8%	0.049	15.8%	0.004	15.8%	0.005	15.8%	0.021

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Southwest	15.9%	0.000	16.0%	0.000	16.0%	0.000	16.0%	0.000
Southeast	15.6%	0.000	15.7%	0.000	15.7%	0.000	15.7%	0.000
Detroit Metro	13.8%	0.000	13.9%	0.000	13.9%	0.000	13.9%	0.000
Cost obligation in prior period								
No	15.8%							
Yes	7.3%	0.000						
Invoice amount in prior period								
\$0			15.2%	0.000	15.4%	0.000		0.000
\$5			14.9%		14.9%			
\$10			14.6%		14.5%			
\$15			14.4%		14.1%			
\$25			13.8%		13.3%			
\$35			13.3%		12.7%			
\$50			12.5%		11.7%			
\$65			11.8%		10.9%			
\$75			11.4%		10.4%			
\$85			10.9%		10.0%			
\$100			10.3%		9.4%			
\$150			8.4%		7.9%			
\$200			6.8%		7.0%			
\$300			4.4%		6.7%			
Interaction (Always 100 X invoice prior)								
Always Below 100: \$0							15.4%	0.000
Always Above 100: \$0							15.4%	
Always Below 100: \$5							14.1%	
Always Above 100: \$5							15.6%	
Always Below 100: \$10							13.0%	
Always Above 100: \$10							15.9%	
Always Below 100: \$15							12.0%	
Always Above 100: \$15							16.1%	
Always Below 100: \$25							10.2%	
Always Above 100: \$25							16.6%	
Always Below 100: \$35							8.8%	
Always Above 100: \$35							16.9%	
Always Below 100: \$50							7.1%	

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Always Above 100: \$50							17.2%	
Always Below 100: \$65							5.9%	
Always Above 100: \$65							17.4%	
Always Below 100: \$75							5.3%	
Always Above 100: \$75							17.4%	
Always Below 100: \$85							4.8%	
Always Above 100: \$85							17.3%	
Always Below 100: \$100							4.3%	
Always Above 100: \$100							16.9%	
Always Below 100: \$150							3.4%	
Always Above 100: \$150							14.6%	
Always Below 100: \$200							3.7%	
Always Above 100: \$200							10.9%	
Always Below 100: \$300							10.8%	
Always Above 100: \$300							3.7%	
Total observations	879,228		879,228		879,228		879,228	

Notes: 1) Prior period invoice is operationalized as a continuous variable and thus has only 1 p-value indicating the statistical significance of the relationship. In the quadratic specification, both prior invoice and (prior invoice)² have $p < 0.001$

2) This is the result of 4 separate regressions run with dependent variable of disenrollment in t+1 (next time period):

a) using cost obligation in t to predict disenrollment (t+1) in first 3 periods

b) using invoice amount (as a continuous variable) to predict disenrollment in (t+1) categories reported were generated using predictive margins

Table 4.3a Predicted Likelihood of Disenrollment in Period--Using Contribution

	Contribution Obligation in Prior Period	p-value	Contribution Amount in Prior Period	p-value	Quadratic in Contribution Amount in Prior Period	p-value	Quadratic in Contribution Amount in Prior Period and Interacting Above/Below 100 FPL	p-value
Federal Poverty Level Category			14.6%		14.7%			
0-35%	10.1%	0.000	11.8%	0.000	11.8%	0.000		
36-99%	8.1%	0.000	16.3%	0.000	16.1%	0.000		
100% +	8.7%							
Age			20.7%		20.7%		20.7%	
Under 30	13.0%	0.000	14.7%	0.000	14.7%	0.000	14.6%	0.000
30 to 39	9.5%	0.000	12.1%	0.000	12.1%	0.000	12.1%	0.000
40 to 49	8.2%	0.000	10.6%	0.000	10.6%	0.000	10.7%	0.000
Over 50	7.3%							
Gender			17.3%		17.3%		17.4%	
Male	11.4%	0.000	11.3%	0.000	11.3%	0.000	11.3%	0.000
Female	7.5%							
Race			13.1%		13.1%		13.1%	
White	8.7%	0.000	13.4%	0.001	13.4%	0.000	13.6%	0.000
Black	9.0%	0.000	16.0%	0.000	16.0%	0.000	16.1%	0.000
American Indian	10.5%	0.000	15.0%	0.000	15.0%	0.000	15.0%	0.000
Hispanic	9.7%	0.000	17.1%	0.000	17.1%	0.000	16.8%	0.000
Asian/Pacific Islander	11.1%	0.000	22.5%	0.000	22.5%	0.000	22.4%	0.000
Unknown	14.2%							
Region			12.9%		12.9%		12.8%	
Upper Penninsula	8.6%	0.000	15.1%	0.000	15.1%	0.000	15.0%	0.000
Northwest	9.7%	0.003	12.3%	0.000	12.3%	0.000	12.3%	0.000
Northeast	8.2%	0.000	14.7%	0.000	14.7%	0.000	14.8%	0.000
West	9.7%	0.000	12.9%	0.000	12.9%	0.000	12.9%	0.000
East Central	8.6%	0.000	13.5%	0.000	13.5%	0.000	13.5%	0.000
East Central	9.0%	0.017	15.8%	0.003	15.8%	0.002	15.8%	0.007

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South Central	10.4%	0.000	16.0%	0.000	16.0%	0.000	16.1%	0.000
Southwest	10.5%	0.000	15.7%	0.000	15.7%	0.000	15.7%	0.000
Southeast	10.2%	0.000	13.9%	0.000	13.9%	0.000	13.9%	2.82E-33
Detroit Metro	9.2%							
Contribution Obligation in Prior Period								
No	9.0%							
Yes	13.2%	0.000						
Invoice Amount in Prior Period			14.8%	0.000	14.7%	0.000		
\$0			14.6%		14.6%			
\$5			14.4%		14.5%			
\$10			14.2%		14.4%			
\$15			13.8%		14.2%			
\$25			13.4%		13.9%			
\$35			12.9%		13.5%			
\$50			12.3%		13.0%			
\$65			12.0%		12.7%			
\$75			11.6%		12.3%			
\$85			11.1%		11.8%			
\$100			9.6%		9.9%			
\$150			8.3%		8.0%			
\$200			6.1%		4.4%			0.000
\$300								
Interaction Always100 # Invoice Prior								
Always Below 100: \$0							14.6%	0.000
Always Above 100: \$0							14.6%	
Always Below 100: \$5							13.8%	
Always Above 100: \$5							15.0%	
Always Below 100: \$10							13.1%	
Always Above 100: \$10							15.4%	

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Always Below 100: \$15							12.5%	
Always Above 100: \$15							15.8%	
Always Below 100: \$25							11.3%	
Always Above 100: \$25							16.5%	
Always Below 100: \$35							10.3%	
Always Above 100: \$35							17.1%	
Always Below 100: \$50							9.0%	
Always Above 100: \$50							17.8%	
Always Below 100: \$65							8.0%	
Always Above 100: \$65							18.2%	
Always Below 100: \$75							7.5%	
Always Above 100: \$75							18.3%	
Always Below 100: \$85							7.0%	
Always Above 100: \$85							18.3%	
Always Below 100: \$100							6.5%	
Always Above 100: \$100							18.0%	
Always Below 100: \$150							5.5%	
Always Above 100: \$150							15.2%	
Always Below 100: \$200							5.6%	
Always Above 100: \$200							10.6%	
Always Below 100: \$300							9.6%	
Always Above 100: \$300							2.5%	
Total Observations			879,228		879,228		879,228	
	1,327,596							

Table 4.3b Predicted Likelihood of Disenrollment in the Period--Using Copay

	Copay Obligation in Prior Period	p-value	Copay Amount in Prior Period	p-value	Quadratic in Copay Amount in Prior Period	p-value	Quadratic in Copay Amount in Prior Period and Interacting Above/Below 100 FPL	p-value
Federal Poverty Level Category								
0-35%	9.9%		14.3%		14.2%			
36-99%	8.0%	0.000	12.9%	0.000	13.0%	0.000		
100% +	9.7%	0.015	15.8%	0.000	15.9%	0.000		
Age								
Under 30	12.9%		20.0%		20.0%		20.0%	
30 to 39	9.5%	0.000	14.5%	0.000	14.5%	0.000	14.5%	0.000
40 to 49	8.2%	0.000	12.2%	0.000	12.2%	0.000	12.2%	0.000
Over 50	7.4%	0.000	10.9%	0.000	10.9%	0.000	11.0%	0.000
Gender								
Male	11.3%		16.8%		16.8%		16.8%	
Female	7.6%	0.000	11.6%	0.000	11.7%	0.000	11.7%	0.000
Race								
White	8.8%		13.2%		13.3%		13.3%	
Black	8.9%	0.015	13.2%	0.817	13.2%	0.610	13.2%	0.000
American Indian	10.3%	0.000	15.3%	0.000	15.2%	0.000	15.2%	0.000
Hispanic	9.7%	0.000	14.9%	0.000	14.9%	0.000	14.9%	0.000
Asian/Pacific Islander	11.1%	0.000	17.0%	0.000	17.0%	0.000	17.0%	0.000
Unknown	14.1%	0.000	22.2%	0.000	22.2%	0.000	22.2%	0.000
Region								
Upper Peninsula	8.7%		12.9%		12.9%		13.0%	
Northwest	9.8%	0.002	15.1%	0.000	15.1%	0.000	15.1%	0.000
Northeast	8.3%	0.000	12.5%	0.000	12.6%	0.000	12.6%	0.000
West	9.7%	0.000	14.5%	0.000	14.5%	0.000	14.6%	0.000
East Central	8.6%	0.000	13.0%	0.000	13.0%	0.000	13.0%	0.000
East	9.0%	0.000	13.6%	0.000	13.6%	0.000	13.6%	0.000

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South Central	10.4%	0.067	15.9%	0.021	15.9%	0.026	15.9%	0.007
Southwest	10.5%	0.000	15.9%	0.000	15.9%	0.000	15.9%	0.000
Southeast	10.2%	0.000	15.6%	0.000	15.6%	0.000	15.6%	0.000
Detroit Metro	9.2%	0.000	13.9%	0.000	13.9%	0.000	13.9%	
Cost Obligation in Prior Period								
No	9.5%							
Yes	9.0%	0.000		0.000				
Invoice Amount in Prior Period								
\$0			15.9%		16.1%	0.000		
\$5			12.8%		12.3%			
\$10			10.2%		9.4%			
\$15			8.0%		7.3%			
\$25			4.9%		4.6%			
\$35			3.0%		3.1%			
\$50			1.4%		2.0%			
\$65			0.6%		1.5%			
\$75			0.4%		1.4%			
\$85			0.2%		1.4%			
\$100			0.1%		1.7%			
\$150			0.0%		11.3%			
\$200			0.0%		87.8%			
\$300								
Interaction Always100 # Invoice Prior								
Always Below 100: \$0							16.1%	0.000
Always Above 100: \$0							16.1%	
Always Below 100: \$5							12.0%	
Always Above 100: \$5							12.9%	
Always Below 100: \$10							9.1%	
Always Above 100: \$10							10.4%	
Always Below 100: \$15							6.9%	
Always Above 100: \$15							8.4%	

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Always Below 100: \$25							4.2%	
Always Above 100: \$25							5.6%	
Always Below 100: \$35							2.8%	
Always Above 100: \$35							3.9%	
Always Below 100: \$50							1.8%	
Always Above 100: \$50							2.5%	
Always Below 100: \$65							1.4%	
Always Above 100: \$65							1.7%	
Always Below 100: \$75							1.3%	
Always Above 100: \$75							1.5%	
Always Below 100: \$85							1.4%	
Always Above 100: \$85							1.3%	
Always Below 100: \$100							1.7%	
Always Above 100: \$100							1.2%	
Always Below 100: \$150							15.7%	
Always Above 100: \$150							2.3%	
Always Below 100: \$200							95.0%	
Always Above 100: \$200							14.9%	
Always Below 100: \$300							n/a	
Always Above 100: \$300							n/a	
Total Observations	1,327,596		879,228		879,228		879,228	

Table 4.4 Detailed Statistical Summary of Average Quarterly Invoice

	Values at Each Percentile of Distribution
1%	0
5%	0
10%	0
25%	0
50%	0
75%	0
90%	26
95%	72
99%	145

Measure	Values
Observations	1,328,015
Mean	9.08
Std. Dev.	27.58
Variance	760.58
Smallest 4 values	0, 0, 0, 0
Largest 4 values	294, 317, 318, 336

Table 4.4a Marginal Effects from a Logit Disenrollment Model that Includes Invoice and Number of Chronic Disease Claims

Marginal Effects from a Logit Disenrollment Model that Includes Invoice and Number of Chronic Disease Claims		
	Marginal Effects	p-value on coefficient
Prior Period Invoice Amount (in dollars)	-0.08%	0.000
Total Chronic Disease Claims (# of claims): 0	ref	
Total Chronic Disease Claims (# of claims): 1-3	-5.00%	0.000
Total Chronic Disease Claims (# of claims): 4-10	-7.92%	0.000
Total Chronic Disease Claims (# of claims): 11+	-10.50%	0.000
Age		
Under 30	ref	
30 to 39	-4.81%	0.000
40 to 49	-6.40%	0.000
Over 50	-7.40%	
Federal Poverty Level Category		
0-35%	ref	0.000
36-99%	-2.98%	0.000
100% +	2.16%	0.000
Gender		
Male	ref	
Female	-5.20%	0.000
Race		
White	ref	
Black	0.02%	0.793
American Indian		
	3.06%	0.000
Hispanic	1.66%	0.000
Asian/Pacific Islander	3.14%	0.000
Unknown	8.71%	0.000
Region		
Upper Peninsula	-1.32%	0.000
Northwest	1.30%	0.000
Northeast	-1.44%	0.000
West	0.90%	0.000
East Central	-0.70%	0.000
East Central	-0.21%	0.099
South Central	1.68%	0.000
Southwest	2.17%	0.000
Southeast	1.59%	0.000
Detroit Metro	ref	
Total Observations	879,228	

Table 4.5 Predicted Disenrollment by Chronic Disease Claims and Total Spending (Plan and Cost Sharing)

	Any Claim in Prior Period	p-value	Conditional on Chronic Disease Claim: Amount of Claims	p-value	Any Spending in Prior Period	p-value	Amount of Spending	p-value on regression coefficient
Federal Poverty Level Category								
0-35%	10.1%		10.5%		9.9%		15.1%	
36-99%	7.8%	0.000	8.7%	0.000	8.0%	0.000	11.8%	0.000
100% +	9.4%	0.000	11.3%	0.000	9.6%	0.000	14.4%	0.000
Age								
Under 30	11.6%		15.1%		12.3%		19.1%	
30 to 39	9.1%	0.000	10.9%	0.000	9.3%	0.000	14.2%	0.000
40 to 49	8.6%	0.000	9.1%	0.000	8.4%	0.000	12.6%	0.000
Over 50	8.2%	0.000	8.5%	0.000	7.7%	0.000	11.4%	0.000
Gender								
Male	11.0%		12.1%		10.6%		16.3%	
Female	7.8%	0.000	8.7%	0.000	8.1%	0.000	12.1%	0.000
Race								
White	8.8%		9.6%		8.9%		13.4%	
Black	8.8%	0.868	9.2%	0.001	8.6%	0.000	13.0%	0.000
American Indian	11.1%	0.000	11.7%	0.000	11.0%	0.000	17.2%	0.000
Hispanic	9.7%	0.000	10.7%	0.000	9.7%	0.000	14.8%	0.000
Asian/Pacific Islander	10.5%	0.000	12.3%	0.000	10.7%	0.000	16.2%	0.000
Unknown	14.0%	0.000	16.8%	0.000	14.0%	0.000	21.8%	0.000
Region								
Upper Peninsula	8.2%	0.000	9.1%	0.000	8.6%	0.000	12.5%	
Northwest	10.0%	0.000	10.8%	0.001	9.9%	0.000	15.0%	0.000
Northeast	8.4%	0.000	9.2%	0.001	8.4%	0.000	12.3%	0.000
West	9.8%	0.000	10.6%	0.005	9.9%	0.000	15.0%	0.000
East Central	8.9%	0.000	9.3%	0.000	8.7%	0.000	12.9%	0.000
East Central	9.2%	0.008	9.9%	0.000	9.2%	0.000	13.6%	0.000

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South Central	10.2%	0.672	11.2%	0.676	10.3%	0.809	15.4%	0.002
Southwest	10.6%	0.000	11.6%	0.000	10.4%	0.000	15.9%	0.000
Southeast	10.0%	0.000	10.9%	0.000	10.2%	0.000	15.5%	0.000
Detroit Metro	9.2%	0.000	10.0%	0.000	9.2%	0.000	13.9%	0.000
Claim in Prior Period								
No	18.1%							
Yes	5.3%	0.000						
Conditional on Claim: Number of Claims								
1			11.5%	0.000				
5			10.1%					
15			7.2%					
25			5.1%					
35			3.6%					
50			2.1%					
65			1.2%					
75			0.8%					
100			0.3%					
Any Spending in Prior Period								
No					24.3%			
Yes					7.5%	0.000		
Total Spending in Prior								
No Spending							23.6%	
\$1 - \$19							16.9%	0.000
\$20-\$40							15.5%	0.000
\$50 - \$99							13.5%	0.000
\$100 - \$349							11.0%	0.000
\$350 +							8.1%	0.000
Total Observations	1327596		463634		1327596		879226	

Table 4.6 Descriptive Table of Population Used in Regression Discontinuity Regressions (up to 13 Months Follow-up)

Descriptive Statistics -- 13 Months Follow-up			
	Disenroller	Continuously Enrolled	P-value from two-sample ttest
Female (%)	51.1	63.1	<0.001
Age (mean)	37.6	40.4	<0.001
First enrollment month	Nov-14	Oct-14	<0.001
FPL percent	85	76.4	<0.001
Region			
Northern Michigan	9.9	10.4	0.003
Central Michigan	30.9	31.1	0.451
Southern Michigan	22.9	19.4	<0.001
Detroit	36.3	39.1	<0.001
Race			
White	61.8	66.6	<0.001
Black	17.7	19.8	<0.001
Other	20.5	13.5	<0.001
Monthly medical spending (mean \$)	165.67	296.51	<0.001
Monthly number of chronic disease claims (mean)	0.24	0.42	<0.001
Received contribution statement (%)	24.5	20.1	<0.001
Received copay statement (%)	27.4	40.4	<0.001
Contribution Invoice (mean \$)	3.17	2.09	<0.001
Copay Invoice (mean \$)	0.35	0.54	<0.001
Total Number	39,289	156,206	
Notes:			
Inclusion Criteria: 1) Not part of special population 2) Between 22 and 62 years of age 3) Enrolled in HMP-MC before Sept 2015, so that we have at least 13 months of potential observation 4) At least 7 months of continuous HMP-MC enrollment 5) Income between 1% and 133% FPL			
Disenroller: Drops HMP-MC after a spell of at least 7 months in the program up to 13 months in program. Disenrollers must not come back to any Michigan Medicaid program for at least 6 months. Must have dropped from HMP-MC, i.e. not switched into another program and then dropped.			

Table 4.7 Basic Statistics for RD Population

13-month total follow-up		
	Percent	Total Number in Group
Percent with Contribution with FPL rounded to nearest 1.....		
99 to 100	22.8	1766
100 to 101	41.2	1791
Contribution Amount	Mean	
Overall	2.31	195,495
90 to 100	1.56	18,411
100 to 110	4.49	20,970
95 to 100	1.81	9,067
100 to 105	4.36	11,810
Percent Disenroller	Percent	
Overall	20.1	195,495
< 100 % FPL	17.9	131,120
>= 100% FPL	24.6	64,375
100 to < 115 FPL	22.8	28,121
85 to < 100 FPL	20.6	28,457
100 to < 105	22.7	9,977
95 to < 100	19.5	9,067
Subgroup with Lower than Median Medical Spending (1st 7 Months)		
Overall	25.9	98,203
< 100 % FPL	23.5	64,582
>= 100% FPL	30.6	33,621
100 to < 115 FPL	28.4	14,788
85 to < 100 FPL	25.5	14,858
100 to < 110	27.8	10,159
90 to < 100	24.3	9,623
Subgroup with Higher than Median Medical Spending (1st 7 Months)		
Overall	14.2	97292
< 100 % FPL	12.4	66538
>= 100% FPL	18.1	30754
100 to < 115 FPL	16.5	13333
85 to < 100 FPL	15.2	13599
100 to < 110	16.1	9038
90 to < 100	15.1	8788
Subgroup with No Chronic Disease Claims (1st 7 Months)		
Overall	25.1	92359
< 100 % FPL	22.8	61181
>= 100% FPL	29.8	31178
100 to < 115 FPL	27.5	13799

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85 to < 100 FPL	25.0	14161
100 to < 110	27.1	9505
90 to < 100	24.3	9177
Subgroup with at least 1 Chronic Disease Claim (1st 7 Months)		
Overall	15.6	103,136
< 100 % FPL	13.6	69,939
>= 100% FPL	19.8	33,197
100 to < 115 FPL	18.2	14,322
85 to < 100 FPL	16.2	14,296
100 to < 110	17.6	9,692
90 to < 100	15.6	9,234

Table 4.8 Regression Discontinuity Estimates, 13 Month

Population followed 13 Months						
Total sample N=195495; Income sample (85 – 115%: 56,578						
Bandwidth selector: linear sharp: MSERD (12.4) CER (6.7); quadratic, sharp: MSERD: 11.1, CER: 5.5)						
Bandwidth selector: linear fuzzy: MSERD (8.3) CER (4.5); quadratic fuzzy: MSERD: (16.3) CER: (8.1)						
RUNNING VARIABLE: AVERAGE FPL PERCENT						
Specification	Bandwidth (equal on both sides)	Covariates?	Estimate (in percentage points)	p-value	First stage coefficient (ppts)	p-value
SHARP: rdrobust, linear	6.749 (CER optimal, triangular kernel)	Y	0.8	>0.1		
SHARP: rdrobust, linear	6.5 (CER optimal, uniform kernel)	Y	2.9	<0.01		
SHARP: rdrobust, linear	7	Y	1.02	0.378		
SHARP: rdrobust, linear	10	Y	2.3	0.015		
SHARP: rdrobust, linear	12	Y	2.6	0.002		
SHARP: rdrobust, linear	15	Y	2.5	0.001		
SHARP: rdrobust, linear	12.4	Y	2.7	<=0.01		
SHARP: rdrobust, quadratic	6	Y	-7.6	0.001		
SHARP: rdrobust, quadratic	10	Y	-0.87	0.558		
SHARP: rdrobust, quadratic	12	Y	0.36	0.786		
SHARP: rdrobust, quadratic	15	Y	2.02	0.079		
SHARP: regress, linear	10	Y	4.6	<0.001	p-value on coefficient plus100	
SHARP: regress, linear	15	Y	4.4	0.228	p-value on coefficient plus100	
FUZZY: rdrobust, linear	4.5 (CER optimal, triangular kernel)	Y	-17.6	<=0.1	16	<0.01
FUZZY: rdrobust, linear	4.5 (CER optimal, uniform kernel)	Y	-6.7	>0.1	19	<0.01
FUZZY: rdrobust, linear	5	Y	-14.7	0.086	17	<0.001
FUZZY: rdrobust, linear	8.3	Y	9.4	<=0.1	19.1	<0.001
FUZZY: rdrobust, linear	10	Y	11.6	0.016	19	<0.001
FUZZY: rdrobust, linear	12	Y	13.2	0.002	20	<0.001
FUZZY: rdrobust, linear	15	Y	12.4	0.001	20.3	<0.001
FUZZY: rdrobust, quadratic	8	Y	-25.3	0.02	16	<0.001
FUZZY: rdrobust, quadratic	10	Y	-5.1	0.556	17	<0.001

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FUZZY: rdrobust, quadratic		12	Y		2	0.787		18	<0.001
FUZZY: rdrobust, quadratic		15			11	0.084		18	<0.001
FUZZY: rdrobust, quadratic		16	y		11	0.068		18	<0.001
FUZZY: 2sls, linear	none		Y		4.3	<0.001			
RUNNING VARIABLE: MINIMUM REPORTED FPL									
Bandwidth selector: linear sharp: MSERD (9) CER (5); quadratic, sharp: MSERD: (9), CER: (4)									
Bandwidth selector: linear fuzzy: MSERD (7) CER (4); quadratic fuzzy: MSERD: (12) CER: (6)									
SHARP: rdrobust, linear		5	Y		-3.7	0.021			
SHARP: rdrobust, linear		9	Y		1.6	0.134			
SHARP: rdrobust, linear		10	Y		2	0.54			
SHARP: rdrobust, linear		12	Y		2.5	0.007			
SHARP: rdrobust, quadratic		10	Y		-1.8	0.29			
SHARP: rdrobust, quadratic		12	Y		-0.39	0.79			
FUZZY: rdrobust, linear		5	Y		-18.8	0.02		20	<0.001
FUZZY: rdrobust, linear		7	Y		2.6	0.649		22	<0.001
FUZZY: rdrobust, linear		10	Y		8.5	0.056		23	<0.001
FUZZY: rdrobust, linear		12	Y		10.6	0.008		23	<0.001
FUZZY: rdrobust, quadratic		10	Y		-8.8	0.286		20	<0.001
FUZZY: rdrobust, quadratic		12	Y		-1.8	0.79		21	<0.001
FUZZY: rdrobust, quadratic		15	Y		10.2	0.003		24	<0.001
FUZZY: 2sls, linear	none		N		-9.3	<0.001			

Table 4.9 Subgroup Analyses on RD Estimates, Medical Claims

	Specification	Bandwidth (equal on both sides)	Covariates?	Estimate (in percentage points)	p-value	First stage coefficient	p-value
Chronic Disease Claims							
No Chronic Disease Claims (n=92,359)							
	Sharp: rdrobust linear	10	Y	3.4 (0.014)	0.013		
	Sharp: rdrobust linear	10.73 (mse chosen)	Y	3.5 (0.013)	0.008		
	Fuzzy: rdrobust linear	10	Y	14.6 (0.060)	0.015	0.23 (0.014)	<0.001
	Fuzzy: rdrobust linear	12	Y	15.0(0.053)	0.005	0.24 (0.013)	<0.001
	Fuzzy: rdrobust linear	8.4 (mse; chosen)	Y	14.1 (0.068)	0.038	.23 (0.016)	<0.001
Chronic Disease Claims (n=103,136)							
	Sharp: rdrobust linear	5.66 (mse chosen)	Y	-2.4 (0.017)	0.169		
	Sharp: rdrobust linear	6	Y	-2.21 (0.017)	0.221		
	Sharp: rdrobust linear	10	Y	0.72 (0.012)	0.555		
	Fuzzy: rdrobust linear	6	Y	-14.3 (0.12)	0.219	0.15 (0.020)	<0.001
	Fuzzy: rdrobust linear	10	Y	4.8 (0.081)	0.56	0.15 (0.014)	<0.001
	Fuzzy: rdrobust linear	12	Y	8.1 (0.073)	0.267	0.15 (0.013)	<0.001
	Fuzzy: rdrobust linear	8.5mse; chosen	Y	1.1 (0.090)	.902	0.15 (0.015)	<0.001
Using Contribution Amount							
No Chronic Disease Claims							
	Contribution Amount (FPL at 100)	8.93 (mse chosen)	Y	1.23 (0.0055)	.027	2.71 (0.0177)	<0.001
	Contribution Amount (FPL at 100)	10	Y	1.24 (.0051)	0.015	2.75 (0.17)	<0.001
Chronic Disease Claims							
	Contribution Amount (FPL at 100)	8.65 (mse chosen)	Y	0.14 (0.0078)	.863	1.70 (0.18)	<0.001
	Contribution Amount (FPL at 100)	10	Y	0.42 (0.0072)	.588	1.71 (0.164)	<0.001

Table 4.10 Estimates Using Monthly Contribution Statement Amounts

Estimates Using Monthly Contribution Statement Amount (not just indicator)								
Specification	Outcome	Independent variable (Instrument)	Estimate (ppts)	Covariates	p-value	Bandwidth (Imputed?)	First Stage Estimate	P-value
Sharp: rdrobust	contribution amount	FPL	2.22	N	<0.001	7.7 (N)		
Sharp: rdrobust	contribution amount	FPL	2.03	N	<0.001	5 (Y)		
Sharp: rdrobust	contribution amount	FPL	2.25	N	<0.001	10 (Y)		
Sharp: rdrobust	contribution amount	FPL	2.02	Y	<0.001	5 (Y)		
Sharp: rdrobust	contribution amount	FPL	2.25	Y	<0.001	10 (Y)		
Fuzzy: rdrobust	disenroller	Contribution Amount (FPL at 100)	0.97	N	0.03	9.162 (N)	2.23	<0.001
Fuzzy: rdrobust	disenroller	Contribution Amount (FPL at 100)	0.803	Y	0.088	8.244(N)	2.22	<0.001
Fuzzy: rdrobust	disenroller	Contribution Amount(FPL at 100)	1.044	N	0.013	10 (Y)	2.25	<0.001
Fuzzy: rdrobust	disenroller	Contribution Amount (FPL at 100)	1.007	Y	0.016	10(Y)	2.25	<0.001
Fuzzy: rdrobust	Disenroller	Contribution Amount (FPL at 100)`	1.1	Y	<=0.05	15(Y)	2.31	<0.001
Regress	disenroller	Contribution Amount	0.65	Y	<0.001			
Subgroup Analyses								
Below Median Spending								
	Disenroller	Contribution Amount (FPL at 100)	1.15	Y	0.048	7.867 (N)	2.834	<0.001
	Disenroller	Contribution Amount (FPL at 100)	1.251	Y	0.008	10(Y)	2.917	<0.001
Above Median Spending								
	Disenroller	Contribution Amount (FPL at 100)	0.568	Y	.448	11.889(N)	1.48	<0.001
	Disenroller	Contribution Amount (FPL at 100)	0.367	Y	.659	10(Y)	1.47	<0.001
No Chronic Disease Claims								
	Disenroller	Contribution Amount (FPL at 100)	1.29	Y	.020	8.937(N)	2.720	<0.001
	Disenroller	Contribution Amount (FPL at 100)	1.453	Y	.005	10(Y)	2.77	<0.001

Chronic Disease Claims	Disenroller	Contribution Amount (FPL at 100)	0.089	Y	.910	8.607(N)	1.70	<0.001
	Disenroller	Contribution Amount (FPL at 100)	0.389	Y	.589	10(Y)	1.71	<0.001

Table 4.11 Alternative Specifications and Sensitivity Checks

	Effect of exceeding cutoff on			Treatment effect of	
	Any contribution (1/0) (percentage points)	Contribution Amount (\$)	Disenrolled (percentage points)	Any Contribution (1/0) (percentage points)	Contribution Amount (\$) (percentage points)
<i>Standard errors in italics</i>					
CER Bandwidth (triangular kernel)	16*** (4.6) <i>0.016</i>	2.03*** (5.0) <i>0.18</i>	0.71 (6.7) <i>0.012</i>	-16.2* (4.6) <i>0.090</i>	-1.4* (4.6) <i>0.0076</i>
CER Bandwidth (uniform kernel)	19*** (4.6) <i>0.015</i>	2.26*** (4.6) <i>0.17</i>	2.9*** (6.5) <i>0.11</i>	-6.5 (4.6) <i>0.072</i>	-0.54 (4.6) <i>0.0061</i>
Global linear (2sls)	36*** <i>0.0021</i>	4.34*** <i>0.028</i>		5.7*** <i>0.0099</i>	0.83*** <i>0.00082</i>
Retaining Average FPL 0% (n=410,295)					
MSE-Optimal Bandwidth (in brackets)	19*** (7.8) <i>0.012</i>	2.21*** (7.7) <i>0.13</i>	-4.0** (3.8) <i>0.017</i>	8.1 (7.8) <i>0.057</i>	0.67 (7.7) <i>0.0049</i>
BW = 10	19*** <i>0.010</i>	2.24*** <i>0.12</i>	2.2** <i>0.0093</i>	11.3** <i>0.049</i>	0.98 <i>0.0042</i>
BW = 15	20*** <i>0.0081</i>	2.31*** <i>0.095</i>	2.4*** <i>0.0075</i>	12*** <i>0.037</i>	1.1*** <i>0.0033</i>
Using 12-month follow up (MSE-optimal) (n=166,014)	20*** (7.0) <i>0.015</i>	2.31 (8.9) <i>0.14</i>	1.9* (10.1) <i>0.011</i>	3.4 (7.0) <i>0.067</i>	0.7 (8.9) <i>0.0050</i>
Using 12-month follow up, BW=10	22*** <i>0.012</i>	2.35*** <i>0.14</i>	1.9* <i>0.011</i>	8.6* <i>0.050</i>	0.81* <i>0.0046</i>
Using 12-month follow up, BW=15	23*** <i>0.0098</i>	2.45*** <i>0.11</i>	1.8** <i>0.0086</i>	7.8** <i>0.038</i>	0.73** <i>0.0036</i>
Running variable of minimum reported FPL, MSE-optimal bandwidth	22*** (7.5) <i>0.012</i>	2.62*** (7.3) <i>0.14</i>	1.8* (9.6) <i>0.010</i>	4.6 (7.5) <i>0.054</i>	0.35 (7.3) <i>0.0047</i>
Running variable of minimum reported FPL, BW=10	23*** <i>0.010</i>	2.68*** <i>0.12</i>	1.9* <i>0.010</i>	8.3* <i>0.045</i>	0.71* <i>0.0038</i>

Notes: Each row shows estimates using a different bandwidth. Columns 1-3 present estimates of a "sharp" regression discontinuity design on the probability an enrollee faces any premium (column 1), the amount of premium they are asked to contribute (column 2), and the probability that they disenroll (column 3). Columns 4 and 5 scale the disenrollment effect by the probability of receiving a premium (column 4) or the premium amount (column 5), presenting the "treatment on the treated" effect of these measures. Significance levels: *=0.10, **=0.05, ***=0.01.

Table 4.12 Sensitivity Check: Descriptive Statistics for Population Followed up to 19 Months

	Disenroller	Continuously Enrolled	P-value from two-sample ttest
Female (%)	52	63.4	<0.001
Age (mean)	38.2	40.4	<0.001
First enrollment month	Aug-14	Aug-14	<0.001*
FPL percent	81.3	71.9	<0.001
Region			
Northern Michigan	10.2	10.3	0.64
Central Michigan	31.7	31.2	0.095
Southern Michigan	23	19.3	<0.001
Detroit	35.1	39.2	<0.001
Race			
White	62.2	66.1	<0.001
Black	18.5	20.8	<0.001
Other	19.4	13.1	<0.001
Monthly medical spending (mean)	186.52	296.19	<0.001
Monthly number of chronic disease claims (mean)	0.26	0.42	<0.001
Received contribution statement (%)	22.7	25.4	<0.001
Received copay statement (%)	29.8	50.9	<0.001
Contribution Invoice (mean)	2.75	2.36	<0.001
Copay Invoice (mean)	0.37	0.62	<0.001
Total Number	35,283	130,731	
Notes:			
Inclusion Criteria: 1) Not part of special population 2) Between 22 and 62 years of age 3) Enrolled in HMP-MC before March 2015, so that we have at least 19 months of potential observation 4) At least 7 months of continuous HMP-MC enrollment 5) Income between 1% and 133% FPL			
Disenroller: Drops HMP-MC after a spell of at least 7 months in the program up to 13 months in program. Disenrollers must not come back to any Michigan Medicaid program for at least 6 months. Must have dropped from HMP-MC, i.e. not switched into another program and then dropped.			
*These are different because disenrollers tend to enroll toward end of month (6.5) while enrollers are toward beginning of month (6.1) likely suggesting more enrollers in earlier parts of program			

Table 4.13 Sensitivity Check--Basic Statistics 19 Months Enrollment

19 month total follow up		
	Percent	Total Number in Group
Percent with Contribution with FPL rounded to nearest 1.....		
99 to 100	31.8	1352
100 to 101	48.1	1394
Percent Disenroller		
Overall	19.4	166,014
< 100 % FPL	16.6	118,252
>= 100% FPL	26.2	47,762
100 to < 115 FPL	23.6	21,308
85 to < 100 FPL	21.3	22, 373
100 to < 105	23	7,664
95 to < 100	20.4	7,011

Table 4.14 Sensitivity Check: RD Estimates from Population Followed for up to 19 Months

Sample followed 19 Months						
Total sample N=166,014						
Bandwidth selector: linear sharp: MSERD (10) CER (6); quadratic, sharp: MSERD: 13, CER: 7)						
Bandwidth selector: linear fuzzy: MSERD (7) CER (4); quadratic fuzzy: MSERD: (16) CER: (8)						
RUNNING VARIABLE: AVERAGE FPL PERCENT						
Specification	Bandwidth (equal on both sides)	Covariates?	Estimate (in percentage points)	p-value	First stage coefficient	p-value
SHARP: rdrobust, linear	7	Y	0.65	0.627		
SHARP: rdrobust, linear	10	Y	1.9	0.077		
SHARP: rdrobust, linear	12	Y	2	0.038		
SHARP: rdrobust, linear	15	Y	1.8	0.035		
SHARP: rdrobust, quadratic	5	Y	-0.14	0.68		
SHARP: rdrobust, quadratic	10	Y	-0.85	0.626		
SHARP: rdrobust, quadratic	12	Y	0.46	0.766		
SHARP: rdrobust, quadratic	15	Y	1.8	0.178		
SHARP: regress, linear	10	Y	4.5	<0.001		
SHARP: regress, linear	15	Y	4.5	0.545		
FUZZY: rdrobust, linear	5	Y	-9.5	0.337	0.168	<0.001
FUZZY: rdrobust, linear	8	Y	5.9	0.315	0.21	<0.001
FUZZY: rdrobust, linear	10	Y	8.6	0.082	0.22	<0.001
FUZZY: rdrobust, linear	12	Y	9	0.041	0.224	<0.001
FUZZY: rdrobust, linear	15	Y	7.9	0.038	0.231	<0.001
FUZZY: rdrobust, quadratic	5	Y	-22.2	0.673	0.061	0.094
FUZZY: rdrobust, quadratic	10	Y	-4.9	0.623	0.174	<0.001
FUZZY: rdrobust, quadratic	12	Y	2.33	0.767	0.195	<0.001
FUZZY: rdrobust, quadratic	15		8.75	0.186	0.204	<0.001
FUZZY: 2sls, linear	none	Y	4	<0.001		

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RUNNING VARIABLE: MINIMUM REPORTED FPL							
Bandwidth selector: linear sharp: MSERD (11) CER (6); quadratic, sharp: MSERD: (12), CER: (6)							
Bandwidth selector: linear fuzzy: MSERD (6) CER (4); quadratic fuzzy: MSERD: (14) CER: (7)							
SHARP: rdrobust, linear		5	Y		-3.1	0.106	
SHARP: rdrobust, linear		9	Y		1.6	0.221	
SHARP: rdrobust, linear		10	Y		1.8	0.131	
SHARP: rdrobust, linear		12	Y		1.9	0.074	
SHARP: rdrobust, quadratic		10	Y		-1.2	0.535	
SHARP: rdrobust, quadratic		12	Y		0.29	0.866	
FUZZY: rdrobust, linear		5	Y		-14.5	0.1	0.21 <0.001
FUZZY: rdrobust, linear		7	Y		2.7	0.667	0.24 <0.001
FUZZY: rdrobust, linear		10	Y		6.9	0.136	0.26 <0.001
FUZZY: rdrobust, linear		12	Y		7.2	0.078	0.27 <0.001
FUZZY: rdrobust, quadratic		10	Y		-5.7	0.531	0.21 <0.001
FUZZY: rdrobust, quadratic		12	Y		1.2	0.867	0.23 <0.001
FUZZY: rdrobust, quadratic		15	Y		6.3	0.072	0.28 <0.001
FUZZY: 2sls, linear	none		N				

Table 4.15 Effect of Premiums on Medicaid Disenrollment

	Effect of exceeding cutoff on			Treatment effect of	
	Any contribution (1/0) (percentage points)	Contribution Amount (\$)	Disenrolled (percentage points)	Any contribution (1/0) (percentage points)	Contribution Amount (\$) (percentage points)
Full Sample					
MSE-Optimal BW (in brackets)	19.1*** (8.3) 0.011	2.22*** (8.4) 0.13	2.6*** (12.3) 0.0083	9.4* (8.3) 0.055	0.82* (8.4) 0.0046
BW=10	19*** 0.010	2.24*** 0.12	2.2** 0.0093	11.6** 0.049	0.98** 0.0042
BW=15	20*** 0.0081	2.31*** 0.095	2.4*** 0.0075	12.4*** 0.037	1.1*** 0.0033
Sample Split by Spending in first 7 months enrollment					
Above Median Spending (>\$77/month)					
MSE-Optimal BW (in brackets)	14*** (9.2) 0.015	1.48*** (11.9) 0.16	.023 (8.4) 0.013	2.1 (9.2) 0.092	0.60 (11.9) 0.0075
BW=10	14*** 0.015	1.48*** 0.18	0.57 0.012	4.1 0.088	0.41 0.0084
Below Median Spending (<\$77/month)					
MSE-Optimal BW (in brackets)	24*** (8.0) 0.016	2.82*** (7.9) 0.18	-1.9† (4.2) 0.023	12.8* (8.0) 0.067	1.06* (7.9) 0.0056
BW=10	24*** 0.014	2.90*** 0.16	3.4*** 0.14	14.3*** 0.058	1.19***
Means of Dependent Variable below/above cutoff, full sample (FPL split in brackets)	22.8/41.2 (99/100-101)	1.81/4.36 (95-99/100-105)	19.5/22.7 (95-99/100-105)		

Notes: Each row shows estimates using a different bandwidth. Columns 1-3 present estimates of a "sharp" regression discontinuity design on the probability an enrollee faces any premium (column 1), the amount of premium they are asked to contribute (column 2), and the probability that they disenroll (column 3). Columns 4 and 5 scale the disenrollment effect by the probability of receiving a premium (column 4) or the premium amount (column 5), presenting the "treatment on the treated" effect of these measures. BW=bandwidth. Significance levels: *<=0.10, **<=0.05, ***<=0.01. †This number is sensitive to kernel specification around the cutoff. Estimate shown, like others, uses a triangular kernel density specification. With a uniform kernel, the MSE-optimal bandwidth is 7.5, estimate is 3.7 and statistically significant (p=0.01).

Table 4.16 Donut Estimator Using MSE-Optimal Bandwidths

	All Eligible					
Dropped FPL	First Stage Estimate	Standard Error	P-value	Treatment Estimate	Standard Error P-value	p-value
95	0.181	0.013	0.000	0.021	0.066	0.753
96	0.186	0.013	0.000	0.053	0.064	0.400
97	0.183	0.013	0.000	0.019	0.066	0.773
98	0.192	0.015	0.000	-0.025	0.071	0.729
99	0.203	0.016	0.000	0.251	0.081	0.002
100	0.204	0.014	0.000	-0.039	0.062	0.525
101	0.189	0.013	0.000	0.247	0.067	0.000
102	0.177	0.012	0.000	-0.039	0.063	0.537
103	0.193	0.012	0.000	0.098	0.057	0.084
104	0.189	0.012	0.000	0.079	0.058	0.172
105	0.189	0.012	0.000	0.074	0.058	0.198
98/99	0.349	0.035	0.000	0.235	0.109	0.032
101/102	0.167	0.015	0.000	0.094	0.082	0.248

Table 4.17 Donut Estimator, Using MSE-Optimal Bandwidths, Split by Medical Spend

	Lower than Median Spend						
Dropped FPL	First Stage Estimate	Standard Error	P-value	Treatment Estimate	Standard Error	P-value	P-value
95	0.238	0.014	0.000	0.148	0.061	0.016	
96	0.236	0.017	0.000	0.124	0.073	0.087	
97	0.231	0.016	0.000	0.117	0.069	0.087	
98	0.241	0.015	0.000	0.100	0.064	0.115	
99	0.257	0.017	0.000	0.328	0.072	0.000	
100	0.253	0.019	0.000	-0.016	0.073	0.827	
101	0.242	0.015	0.000	0.305	0.067	0.000	
102	0.221	0.017	0.000	0.024	0.076	0.754	
103	0.243	0.015	0.000	0.165	0.063	0.010	
104	0.237	0.016	0.000	0.129	0.069	0.060	
105	0.237	0.016	0.000	0.131	0.068	0.053	
98/99	0.277	0.021	0.000	0.377	0.089	0.000	
101/102	0.214	0.017	0.000	0.200	0.080	0.012	
	Higher than Median Spend						
95	0.133	0.017	0.000	-0.041	0.107	0.705	
96	0.135	0.017	0.000	-0.018	0.104	0.865	
97	0.124	0.018	0.000	-0.090	0.119	0.451	
98	0.150	0.019	0.000	-0.005	0.107	0.959	
99	0.142	0.021	0.000	0.157	0.126	0.215	
100	0.150	0.021	0.000	-0.083	0.112	0.458	
101	0.123	0.022	0.000	-0.026	0.148	0.862	
102	0.127	0.018	0.000	-0.168	0.117	0.151	
103	0.139	0.016	0.000	0.009	0.098	0.926	
104	0.142	0.015	0.000	0.034	0.087	0.694	
105	0.139	0.015	0.000	0.029	0.090	0.743	
98/99	0.235	0.025	0.000	0.359	0.108	0.001	
101/102	0.114	0.019	0.000	-0.034	0.136	0.805	

Table 4.18 Donut Estimator, Using MSE-Optimal Bandwidths, Split by Chronic Disease Diagnosis

No Chronic Disease Diagnoses						
Dropped FPL	First Stage Estimate	Standard Error	P-value	Treatment Estimate	Standard Error P-value	P-value
95	0.217	0.018	0.000	0.092	0.084	0.270
96	0.230	0.016	0.000	0.145	0.068	0.034
97	0.222	0.016	0.000	0.122	0.074	0.102
98	0.233	0.017	0.000	0.112	0.073	0.127
99	0.244	0.020	0.000	0.322	0.089	0.000
100	0.242	0.019	0.000	0.060	0.075	0.424
101	0.237	0.016	0.000	0.302	0.070	0.000
102	0.214	0.018	0.000	0.019	0.083	0.823
103	0.229	0.016	0.000	0.154	0.072	0.033
104	0.231	0.015	0.000	0.150	0.067	0.025
105	0.226	0.016	0.000	0.131	0.073	0.072
98/99	0.310	0.030	0.000	0.407	0.121	0.001
101/102	0.211	0.021	0.000	0.165	0.097	0.089
Chronic Disease Diagnoses						
95	0.150	0.015	0.000	0.027	0.085	0.752
96	0.150	0.016	0.000	0.002	0.090	0.985
97	0.138	0.016	0.000	-0.061	0.103	0.549
98	0.161	0.017	0.000	0.000	0.094	0.998
99	0.157	0.023	0.000	0.171	0.133	0.199
100	0.156	0.017	0.000	-0.078	0.092	0.393
101	0.144	0.017	0.000	0.182	0.108	0.090
102	0.137	0.018	0.000	-0.166	0.113	0.141
103	0.162	0.014	0.000	0.080	0.074	0.284
104	0.151	0.016	0.000	0.011	0.089	0.906
105	0.150	0.015	0.000	0.018	0.088	0.840
98/99	0.236	0.023	0.000	0.369	0.098	0.000
101/102	0.122	0.020	0.000	0.003	0.143	0.981

Table 4.19 Estimated Change at 100 percent FPL for Demographic Covariates (MSE-optimal bandwidths; triangular kernel)

Estimate of jump at 100% FPL	Standard error	p-value	Bandwidth
0.77	0.28	0.005	9.228
-0.29	0.010	0.004	11.773
-0.0098	0.0084	0.25	14.663
0.0020	0.0074	0.79	12.444
0.0053	0.0068	0.44	14.548
-0.011	0.0073	0.140	8.941
0.0127	0.010	0.220	10.416
0.0052	0.0089	0.561	10.548
-0.0076	0.0100	0.444	11.115
Estimated from RD local linear equations where each covariate is a dependent variable and covariates not in the same demographic category are covariates in regressions.			

Table 4.20 Total Spending Regressions; Predicted Monthly Spending by Covariates

	Total Spending		Medical Spending		Rx Spending		Total Spending: Disenroller interacted with Above 100	
	Estimate	pvalue	Estimate	pvalue	Estimate	pvalue	Estimate	pvalue
Disenroller								
No	\$ 293.15		\$ 215.74		\$ 77.86			
Yes	\$ 175.84	0.000	\$ 132.46	0.000	\$ 43.57	0.000		
Gender								
Male	\$ 242.83		\$ 167.99		\$ 75.01		\$ 242.83	
Female	\$ 289.20	0.000	\$ 220.80	0.000	\$ 69.13	0.000	\$ 289.20	0.000
Age in Bands (under 30 reference)								
30 to 39	\$ 296.86	0.036	\$ 204.95	0.647	\$ 98.10	0.000	\$ 296.84	0.033
40 to 49	\$ 378.60	0.000	\$ 261.50	0.000	\$ 125.63	0.000	\$ 378.61	0.000
over 50	\$ 422.99	0.000	\$ 303.95	0.000	\$ 128.00	0.000	\$ 423.00	0.000
Region of Residence (Detroit reference)								
UP/Northern Michigan	\$ 237.90	0.000	\$ 175.68	0.000	\$ 63.39	0.000	\$ 237.90	0.000
Region: Central Mich.	\$ 257.67	0.000	\$ 193.98	0.017	\$ 65.34	0.000	\$ 257.67	0.000
Region: Southern Mich.	\$ 318.91	0.002	\$ 245.65	0.001	\$ 72.74	0.487	\$ 318.92	0.002
Race (White reference)								
Black	\$ 243.26	0.000	\$ 172.52	0.000	\$ 69.62	0.301	\$ 243.28	0.000
Other	\$ 239.57	0.000	\$ 177.93	0.005	\$ 61.94	0.000	\$ 239.55	0.000
FPL_percent		0.000		0.000		0.000		0.000
25	\$ 463.78		\$ 387.43		\$ 90.88		\$ 467.40	
50	\$ 366.13		\$ 291.27		\$ 81.24		\$ 367.86	
75	\$ 289.05		\$ 218.97		\$ 72.61		\$ 289.52	
100	\$ 228.19		\$ 164.62		\$ 64.91		\$ 227.87	
125	\$ 180.15		\$ 123.76		\$ 58.02		\$ 179.34	
Disenroller								
No: Above 100% FPL							\$ 291.66	0.933
No: Below 100% FPL							\$ 293.90	
Yes: Above 100% FPL							\$ 174.53	0.959
Yes: Below 100% FPL							\$ 176.54	0.000

Notes: Spending reflects both plan and patient payments to medical providers and pharmacies adjudicated through the claims process. Regression specified as a generalized linear model with a log link and gamma family. Predictions obtained using marginal effects at actual values through the *margins* command in Stata 14.2

Figure 4.1 Unadjusted Probability of Disenrollment by Prior Period Invoice Amount

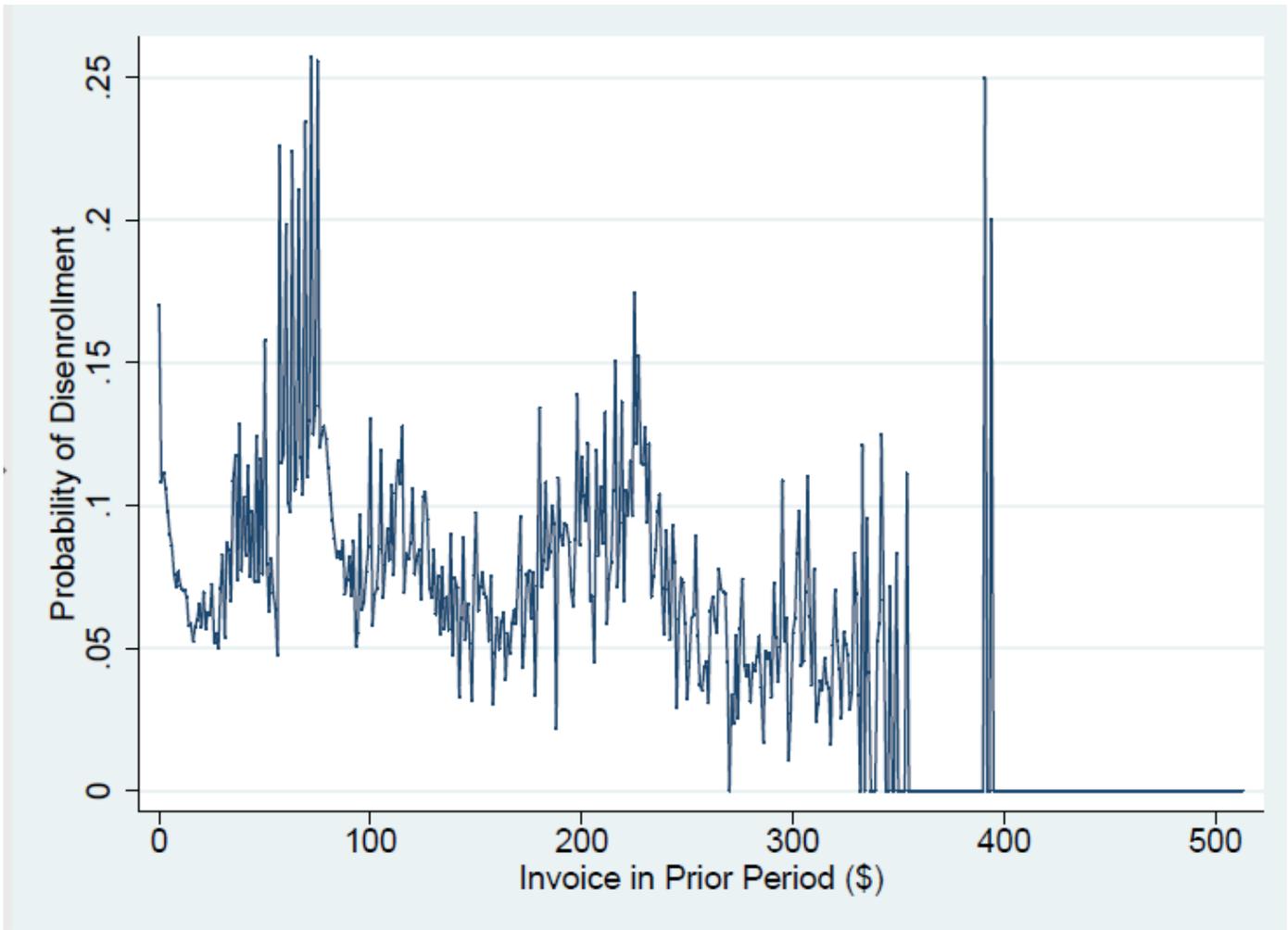


Figure 4.1a Unadjusted Probability of Disenrollment by Prior Period Invoice Amount, Invoice <= \$150

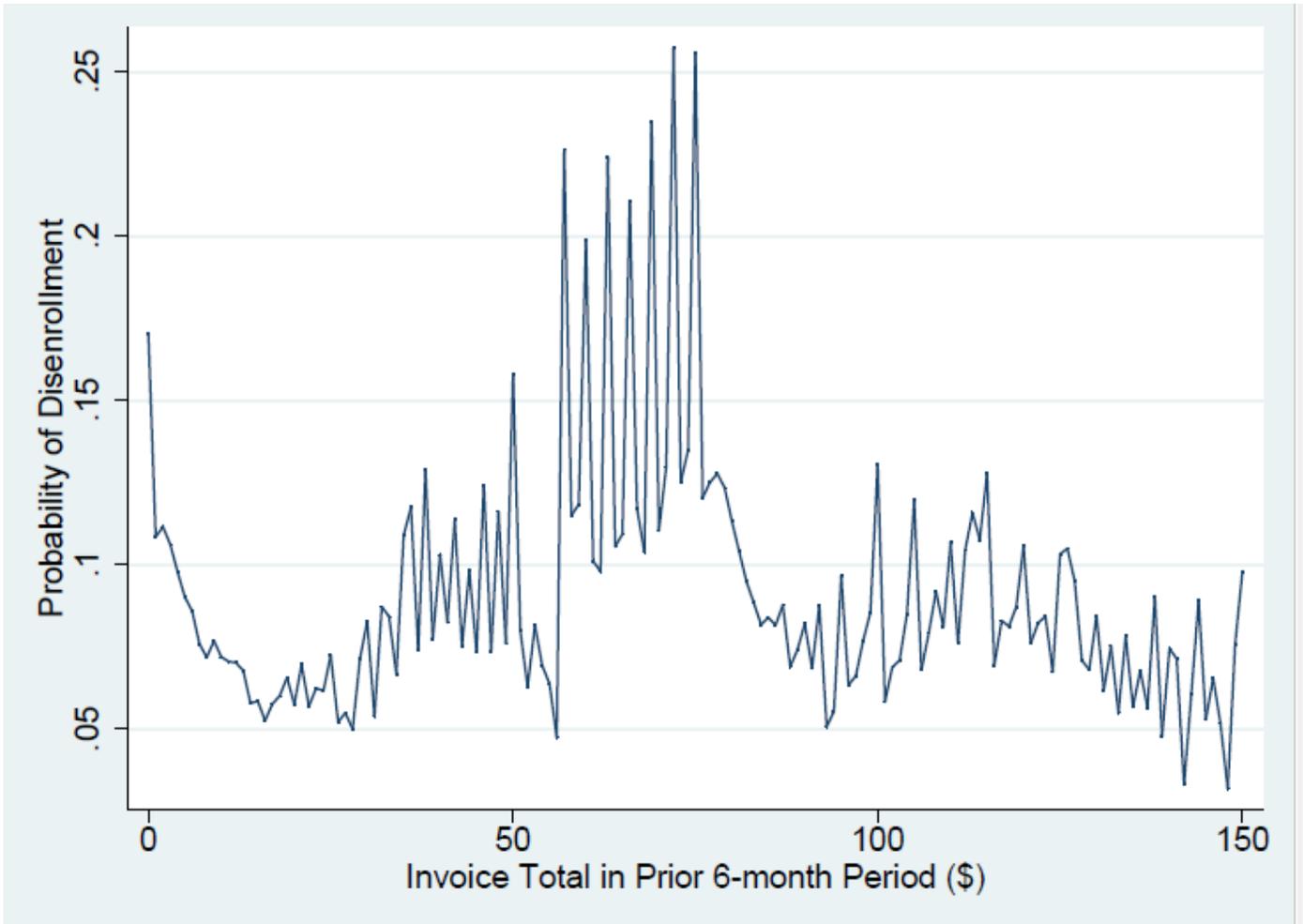


Figure 4.2 Predicted Probability of Disenrollment by Prior Period Invoice Amount, Logit Regression with Invoice Specified Linearly

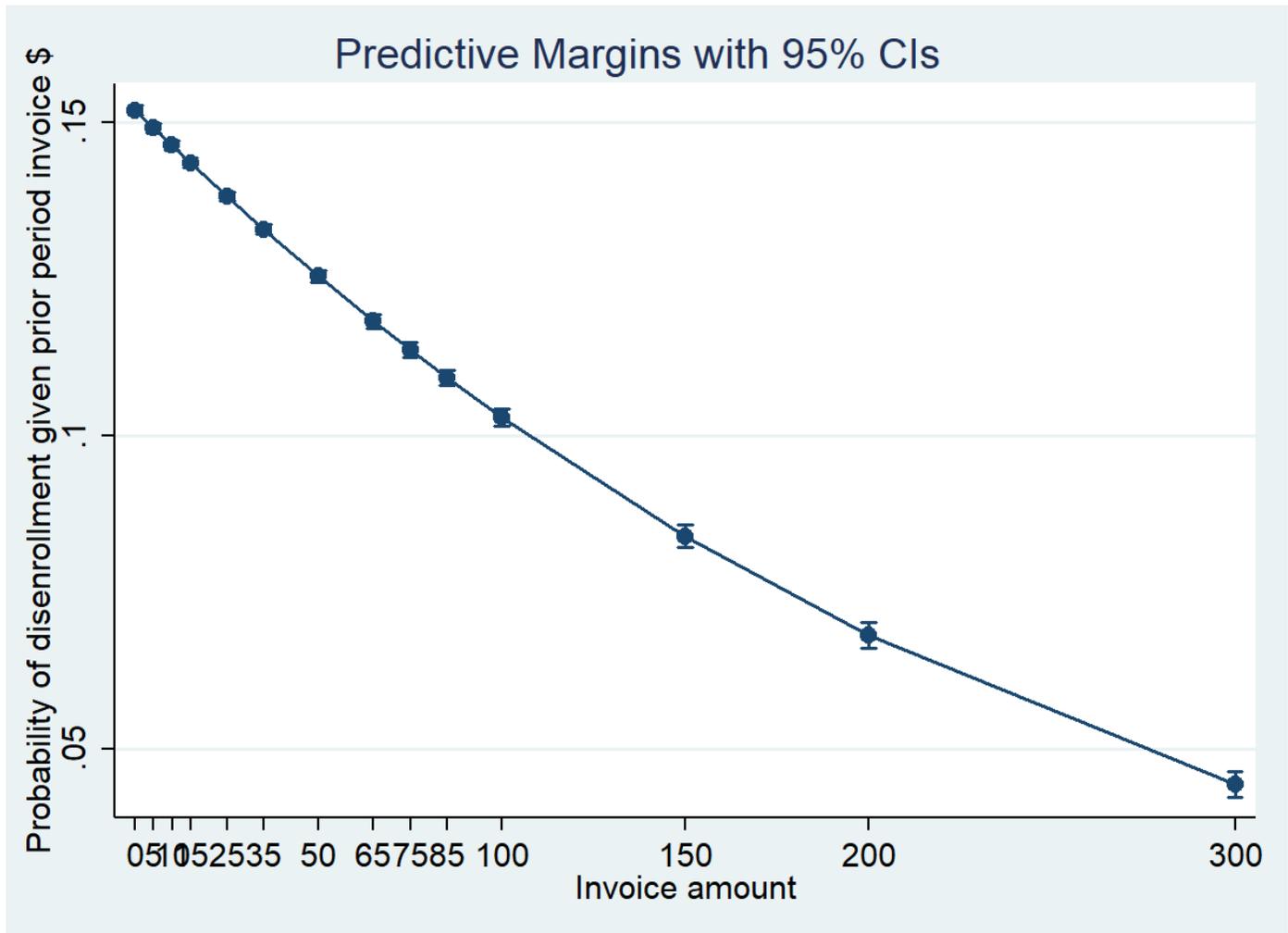


Figure 4.2a Predicted Probability of Disenrollment by Prior Period Invoice Amount Logit Regression with Invoice Specified Quadratically

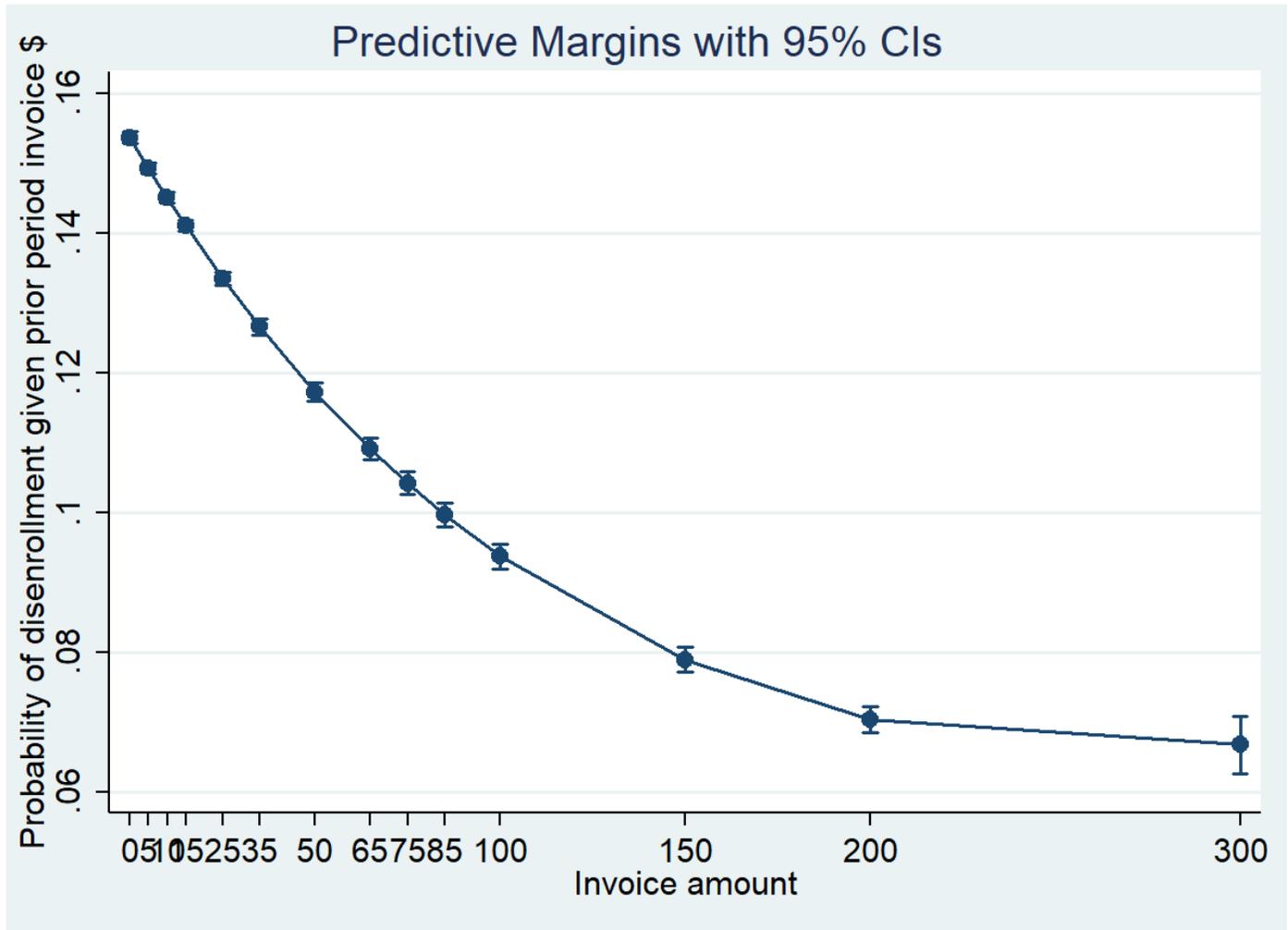


Figure 4.2b Predicted Probability of Disenrollment by Prior 6-11 Period Invoice Amount Interacted with FPL Above/Below 100%, Logit Regression with Invoice Specified Quadratically

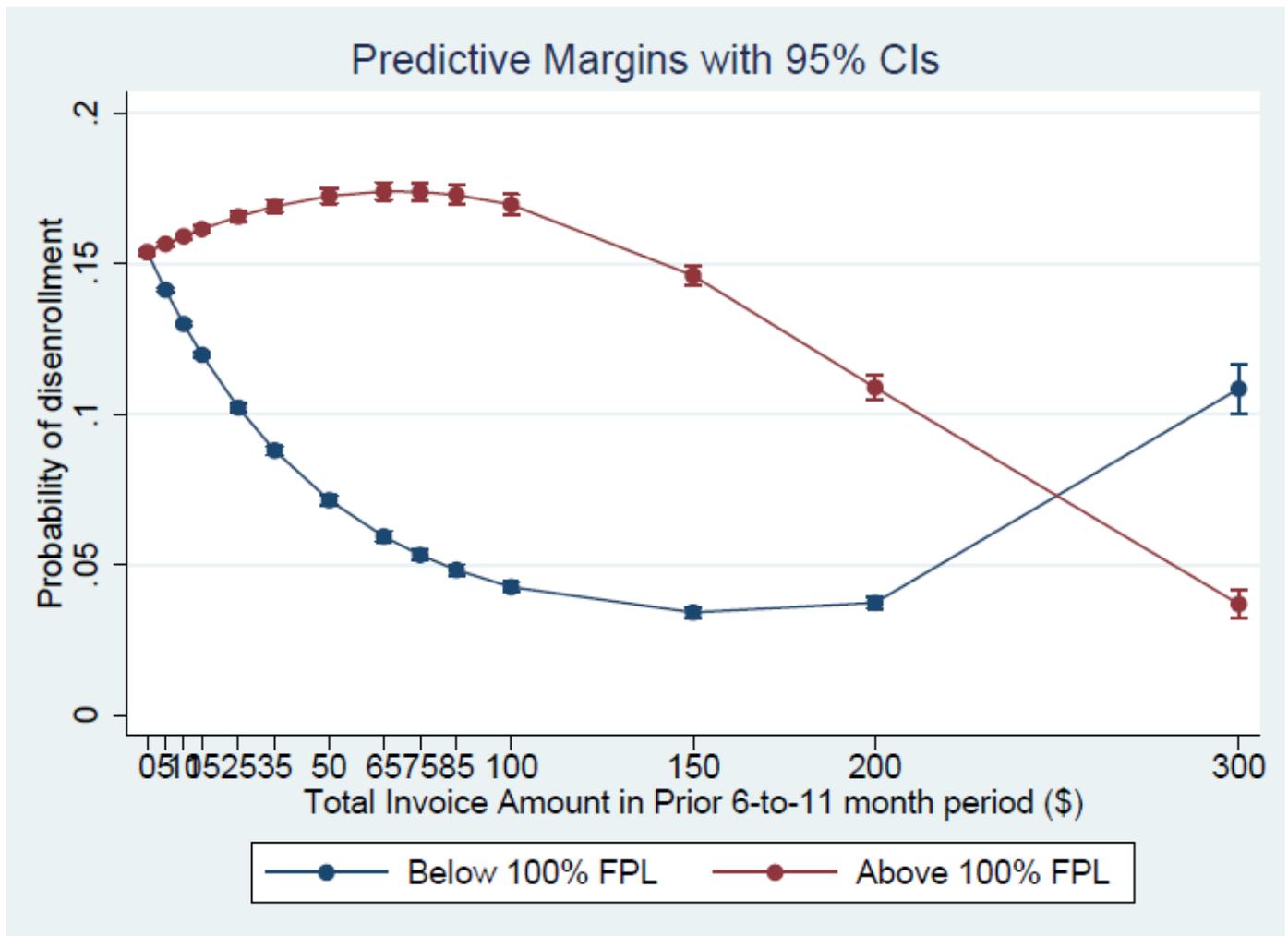


Figure 4.2c Predicted Probability of Disenrollment by Prior 6-11 Month Contribution Amount Interacted with FPL Above/Below 100%, Logit Regression with Invoice Specified Quadratically

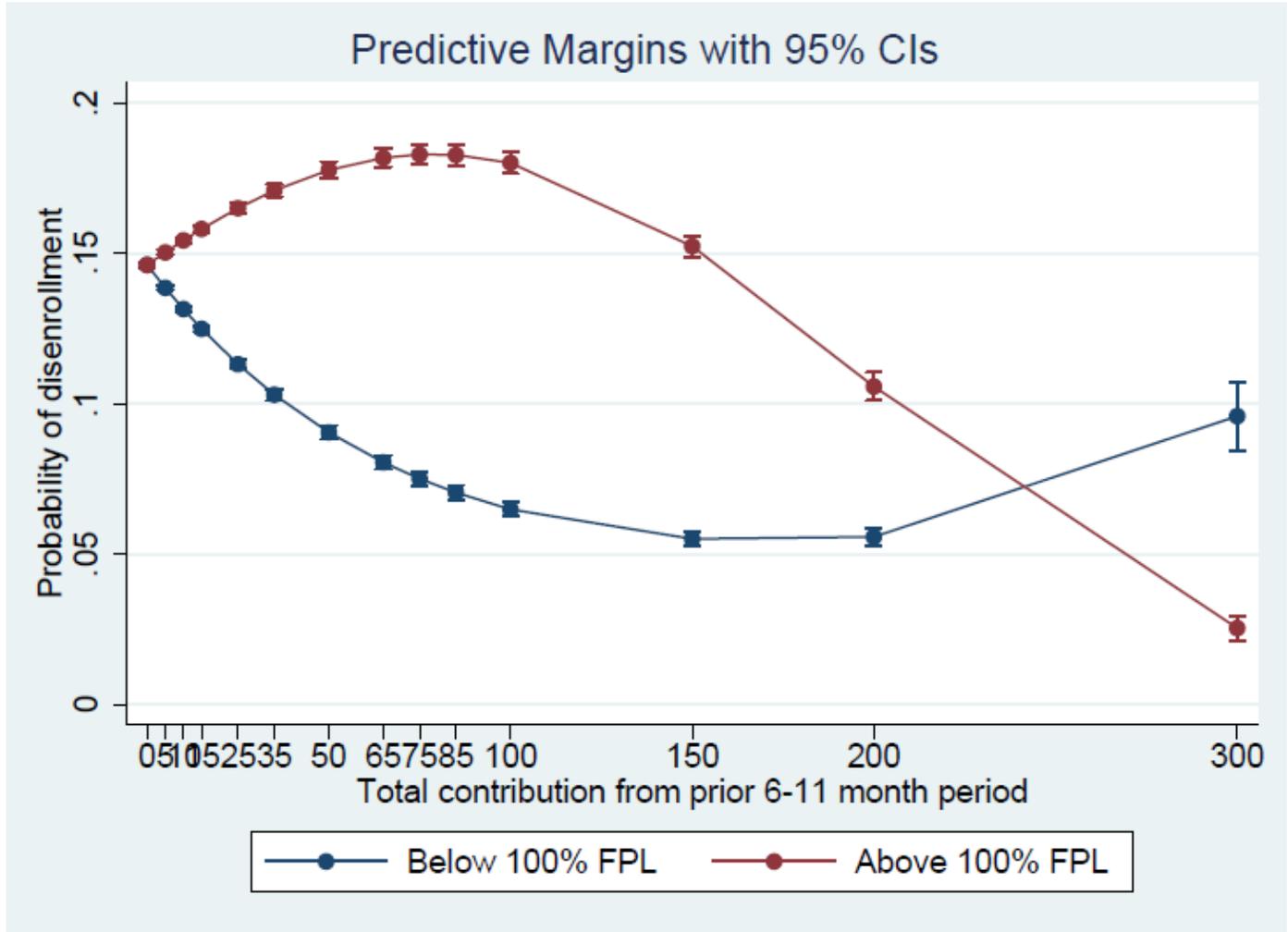


Figure 4.2d Predicted Probability of Disenrollment by Prior 6-11 Month Copay Amount Interacted with FPL Above/Below 100%, Logit Regression with Invoice Specified Quadratically

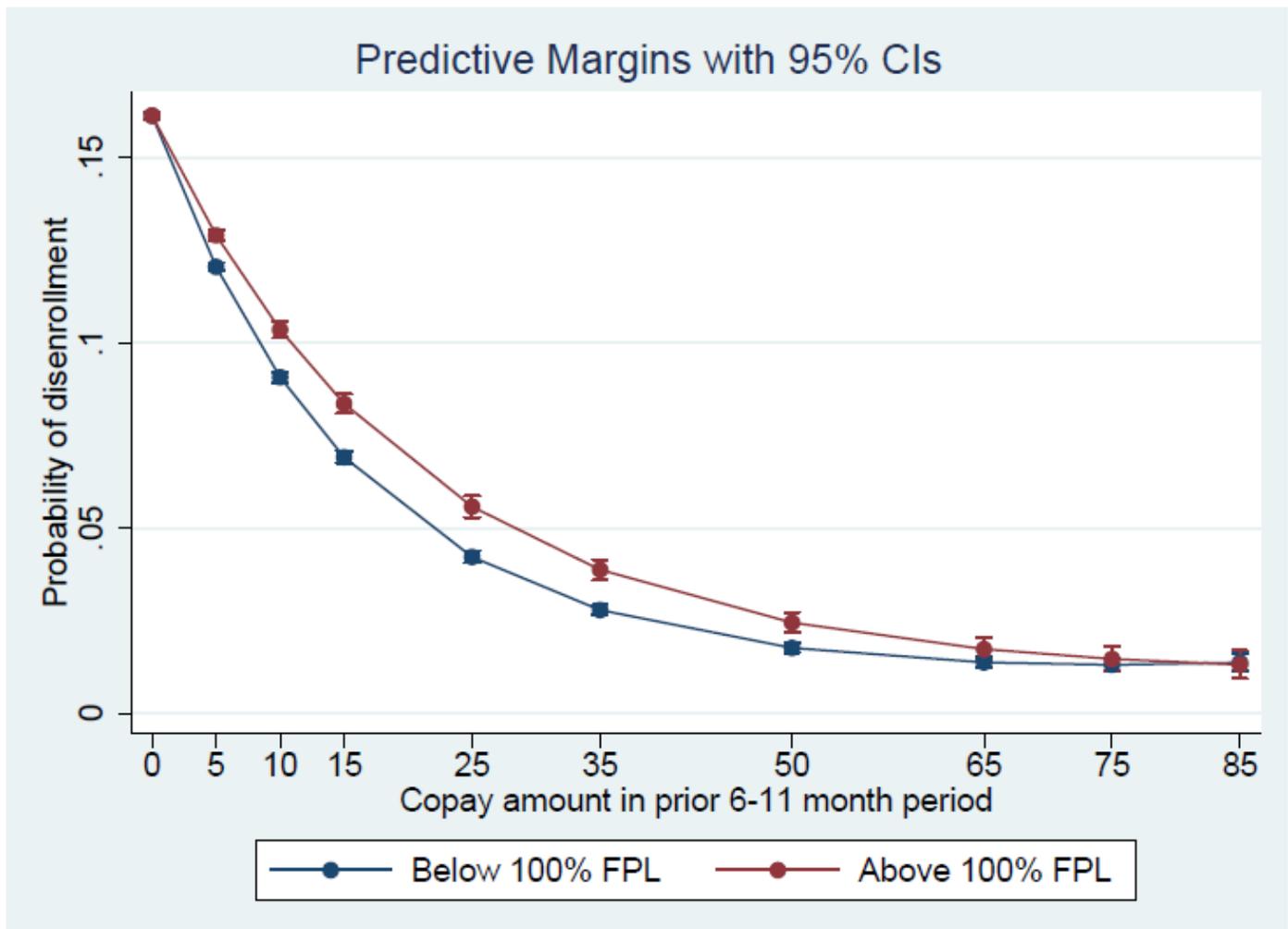


Figure 4.3 Histogram of FPL

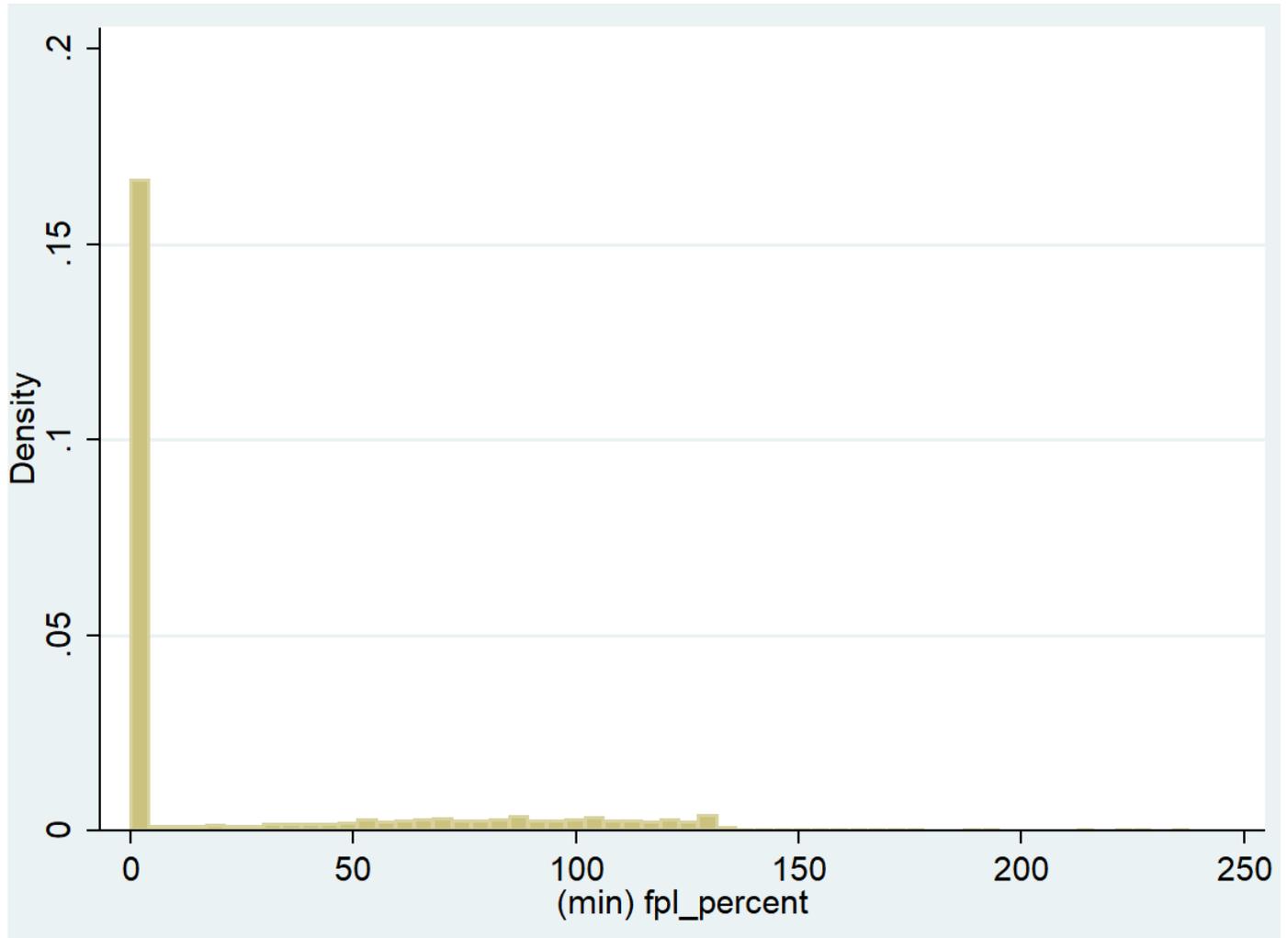


Figure 4.3a Histogram of Federal Poverty Level (>0% FPL to 133% FPL, rounded to nearest whole percent, from RD analysis (n=195,495)

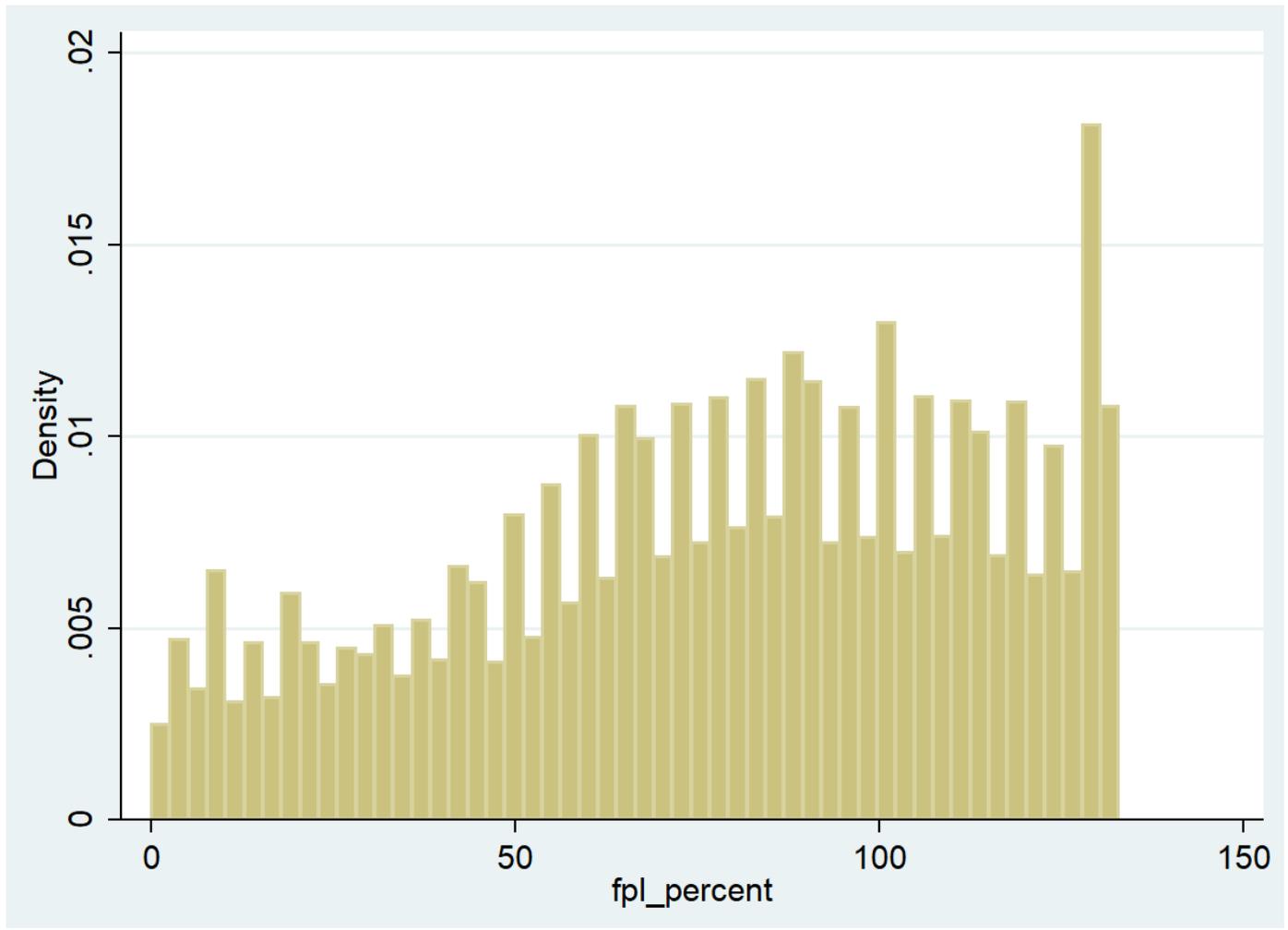


Figure 4.3b Histogram of FPL > 70% and <130%, from RD analysis

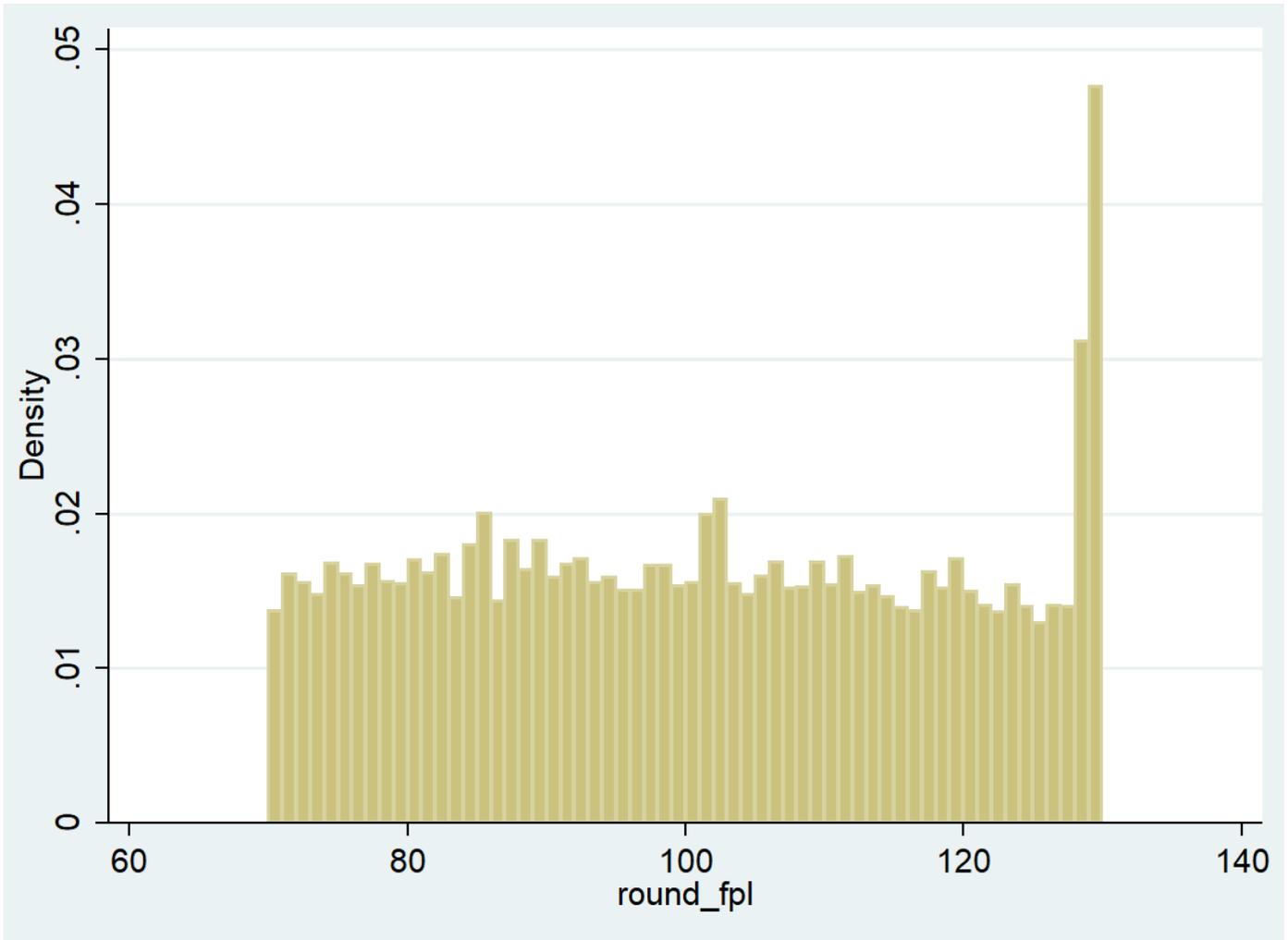


Figure 4.3c Histogram of FPL > 90% and <110%, from RD analysis

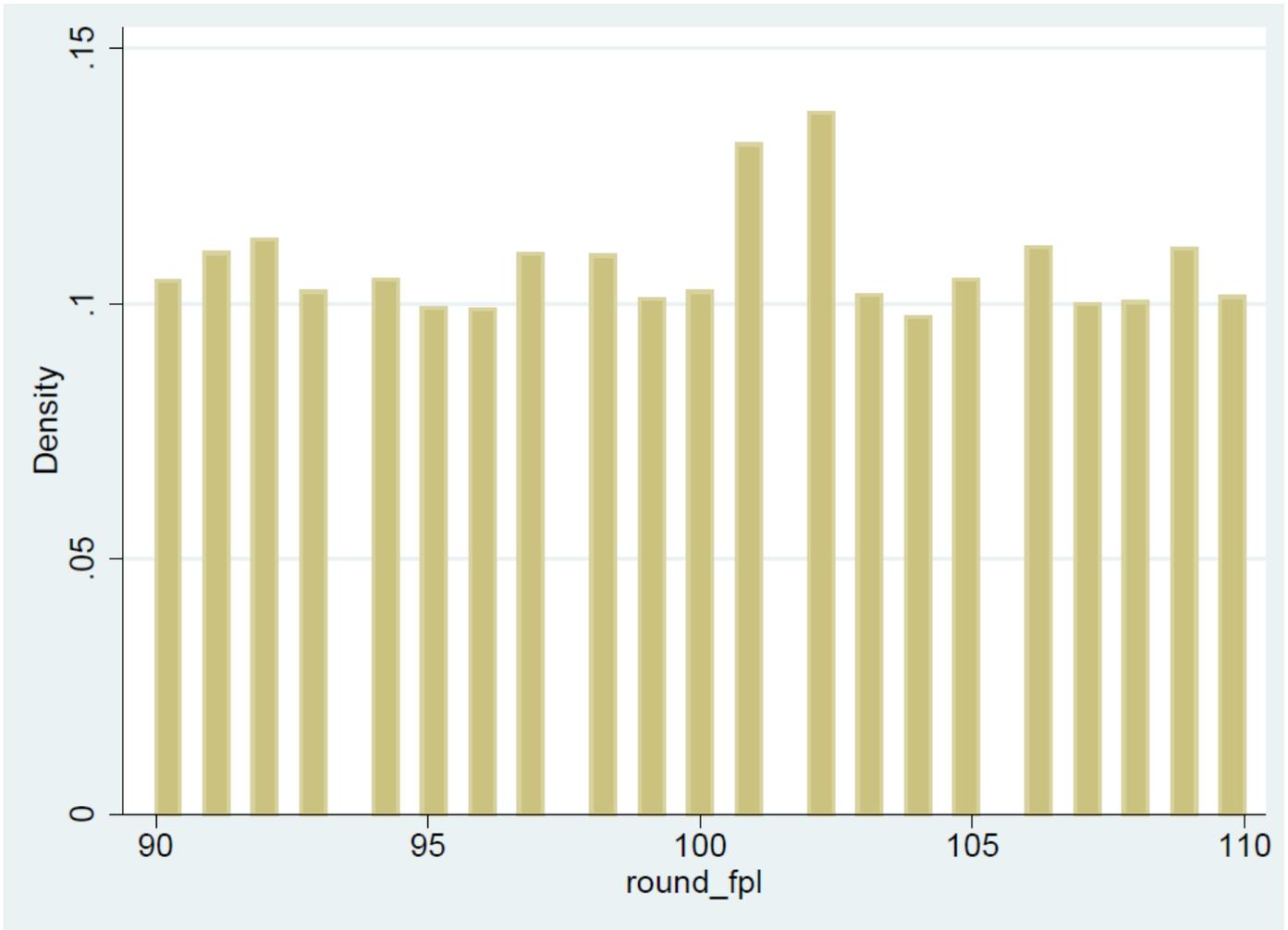
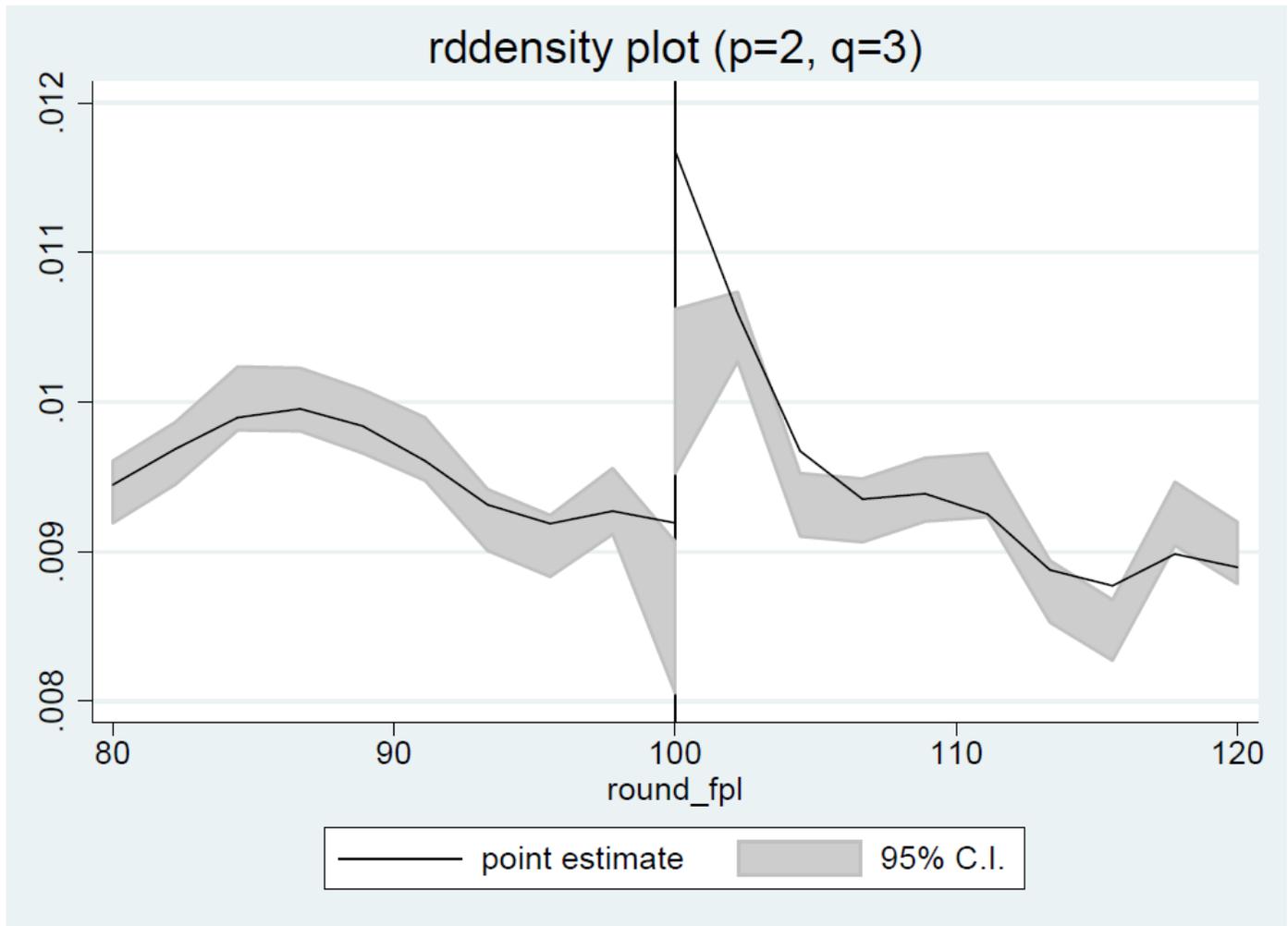
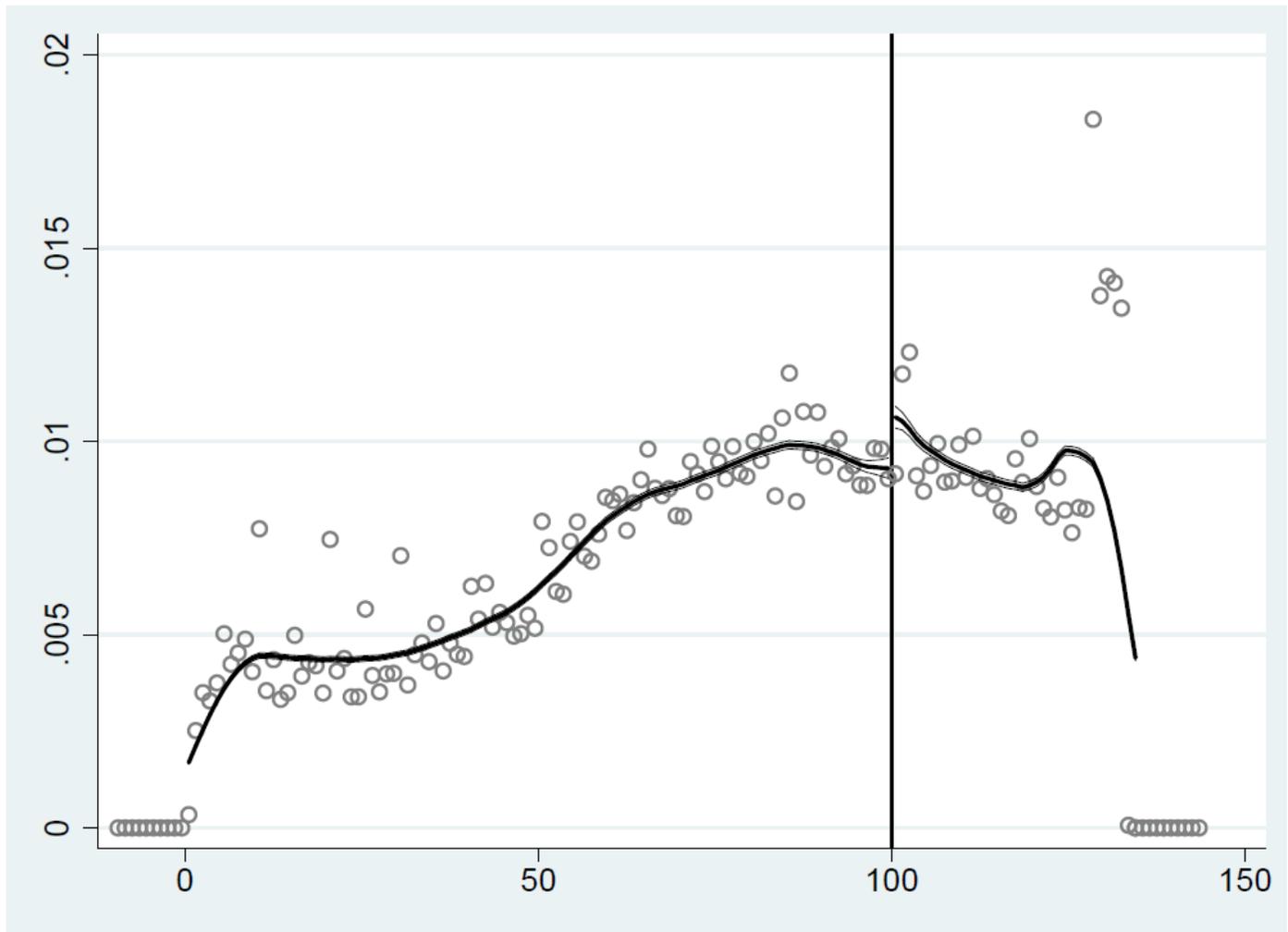


Figure 4.3d CCT RD Density Plot



Notes: The T-statistic estimating the degree of difference in density on either side of the cutoff line is 2.5642. The p-value of the confidence with which we can reject the null that this difference is not different than 0 is 0.0103. At conventional levels, then, we see there is a difference in density, here the density is higher on the right side of the cutoff (>100% FPL).

Figure 4.3e McCrary Density Plot



Notes: Output from the McCrary density test looks like this Discontinuity estimate (log difference in height): .143254085 (.022192522). I believe this rejects the null of no difference with a confidence level of $p=0.022$, though I couldn't find much documentation on the output.

I also ran density tests on a break at 85 FPL [(log difference in height).0633405 (.021863919)]; 90 FPL [(log difference in height): -.073934225 (.022139484)] and 110 [(log difference in height): .026855361 (.023011226)].

Figure 4.4 Histogram of Time to First Invoice

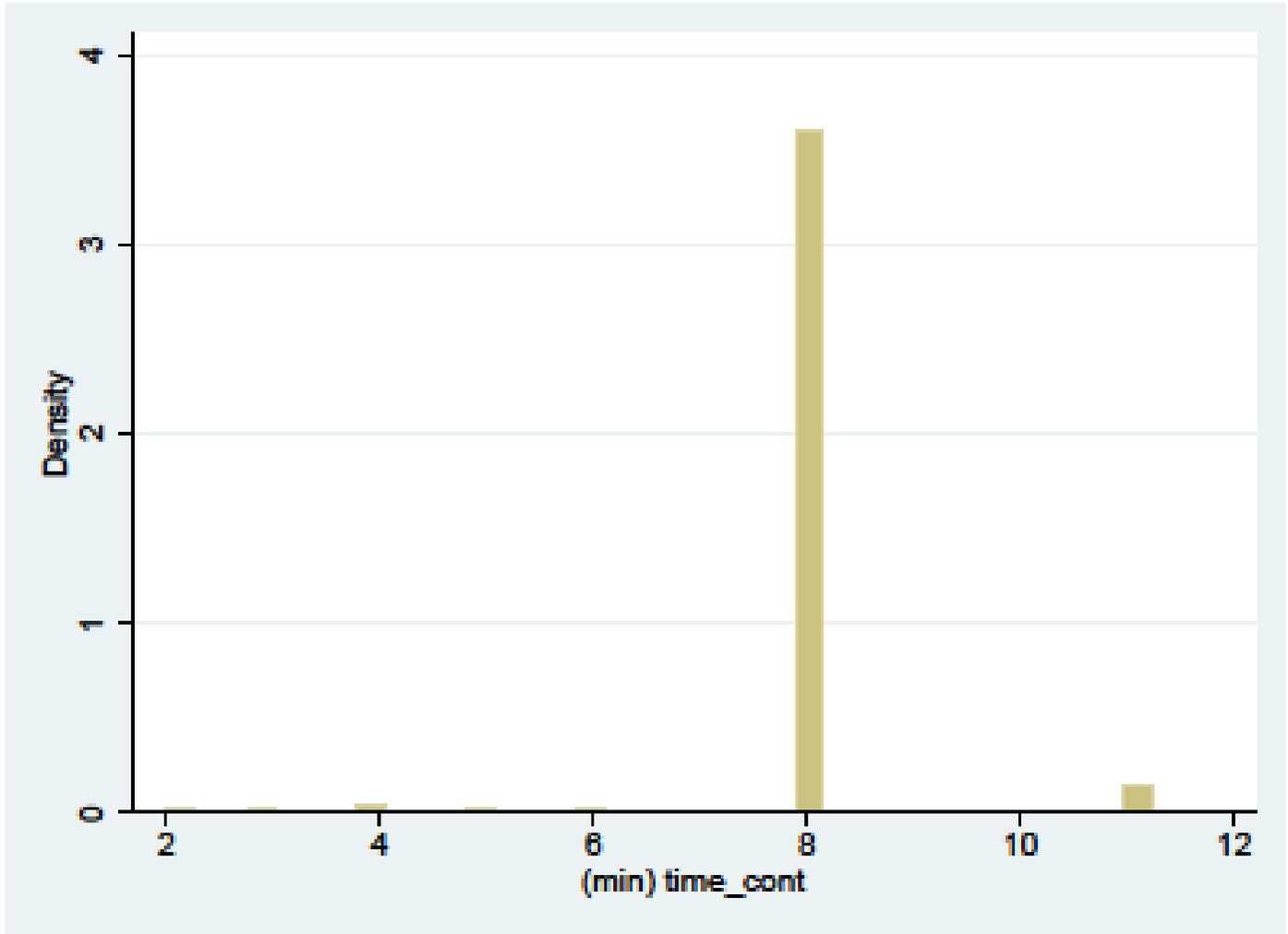


Figure 4.4a Time to First Contribution Invoice

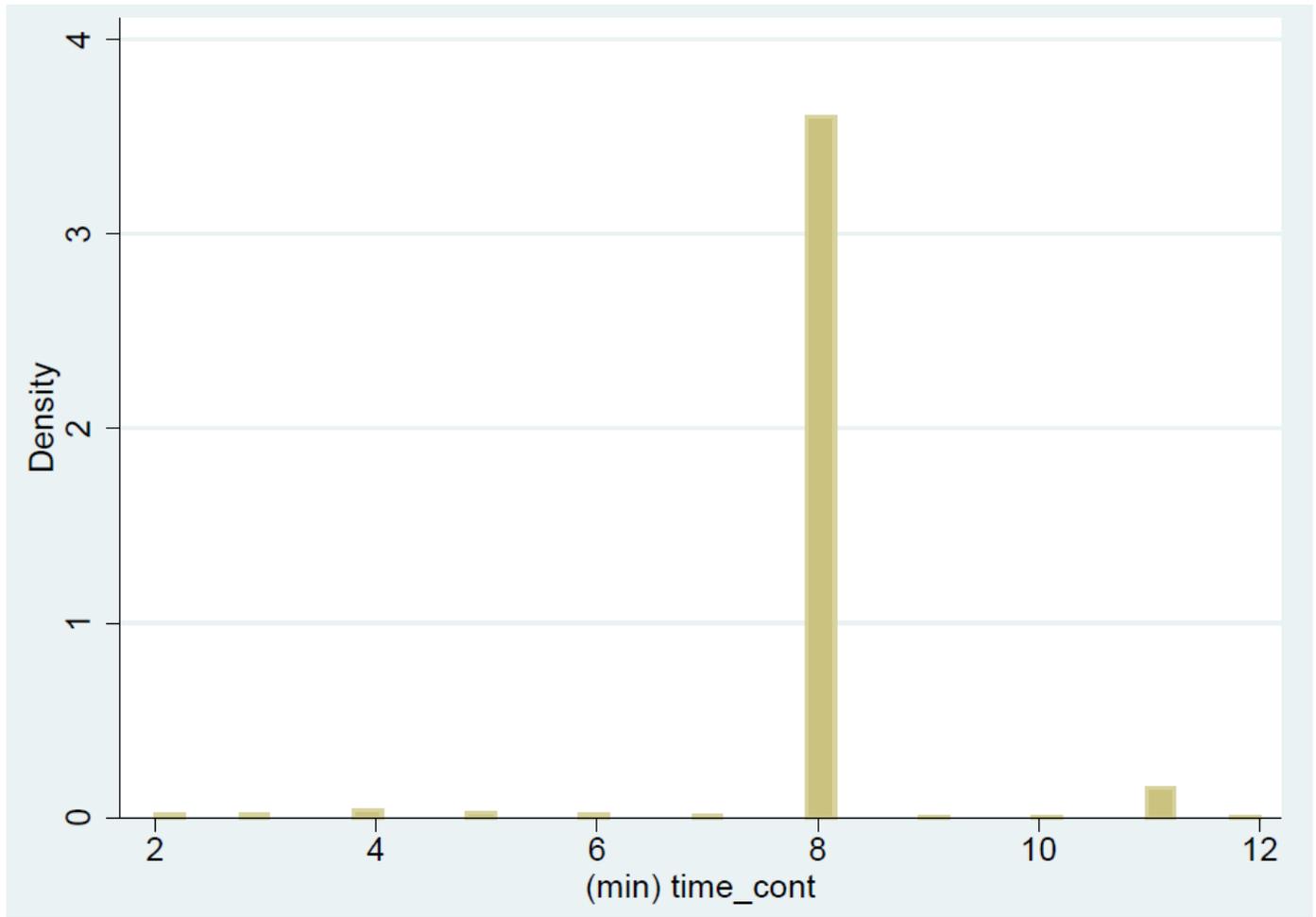


Figure 4.5 Time of Disenrollment

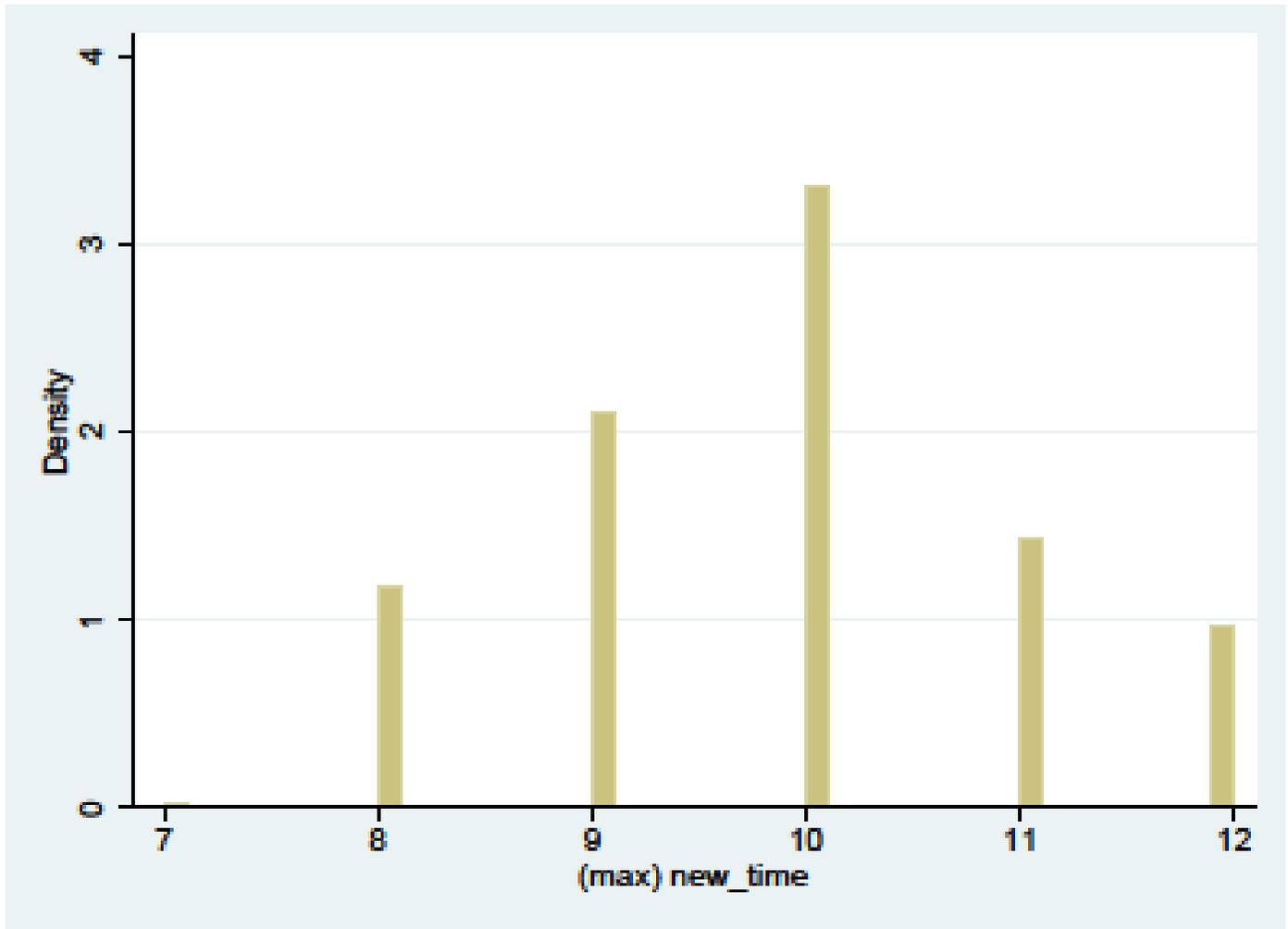


Figure 4.5a Percent of Beneficiaries who Drop by Number of Months Enrolled

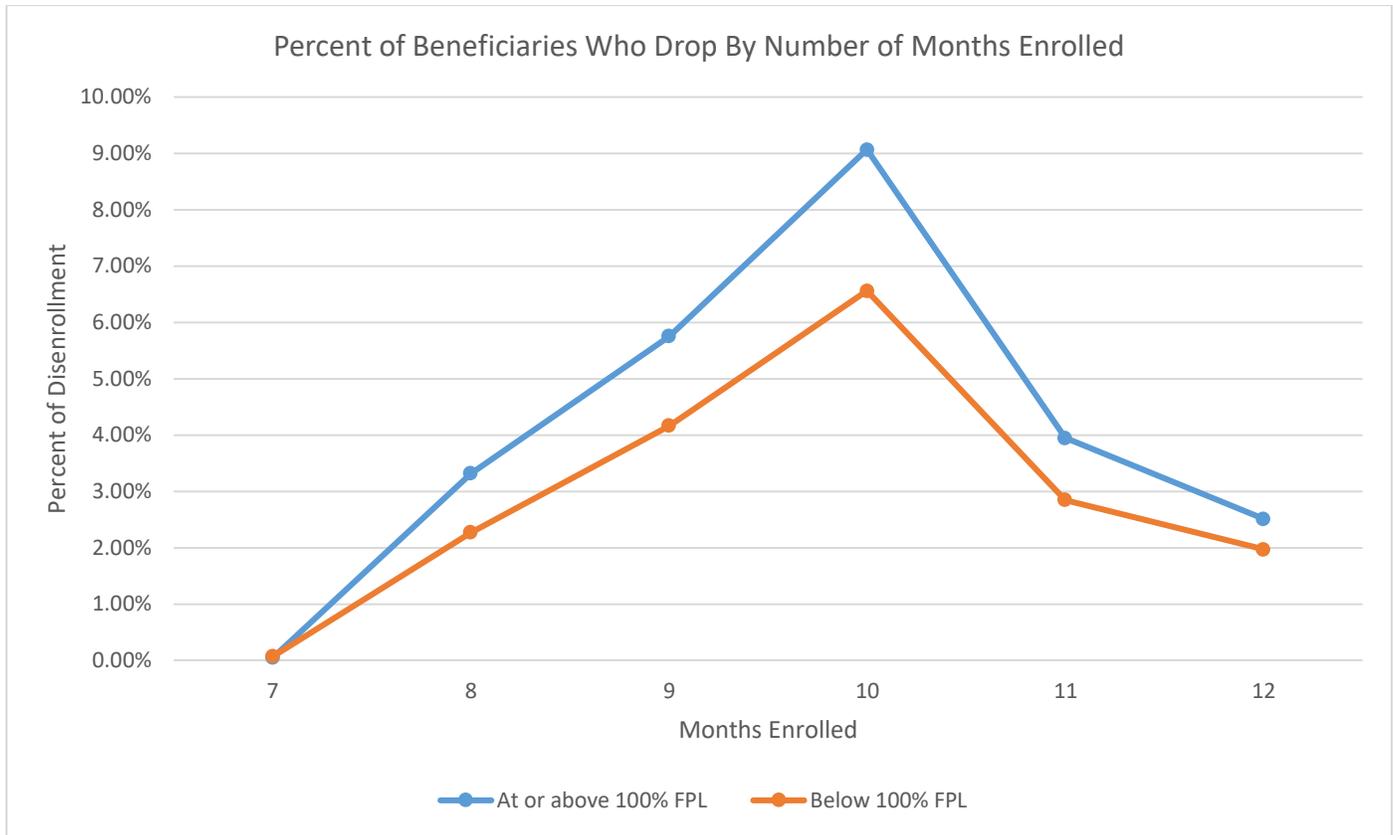


Figure 4.6 Likelihood of Contribution and FPL Scatterplot

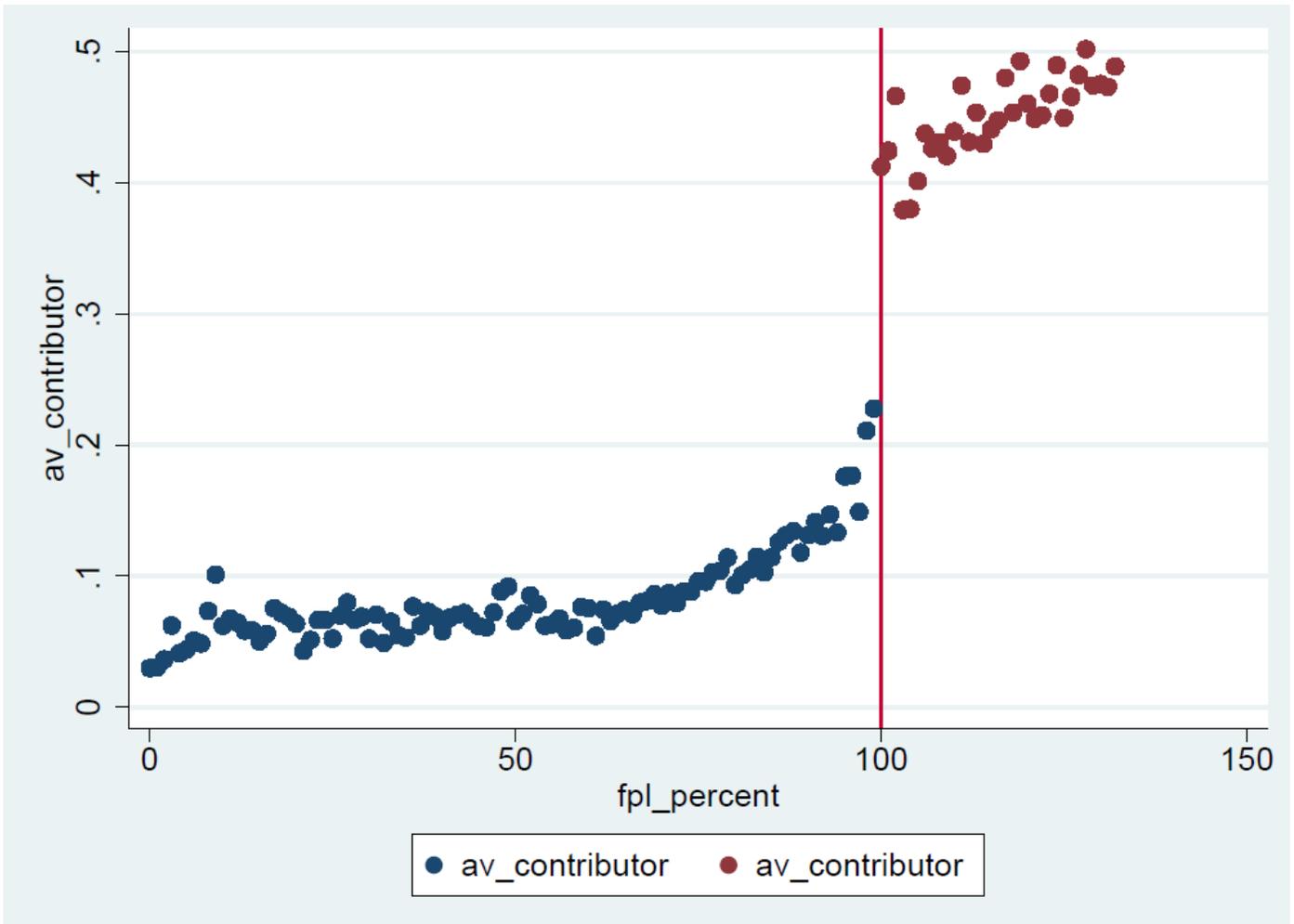


Figure 4.6a Contribution Amount and FPL

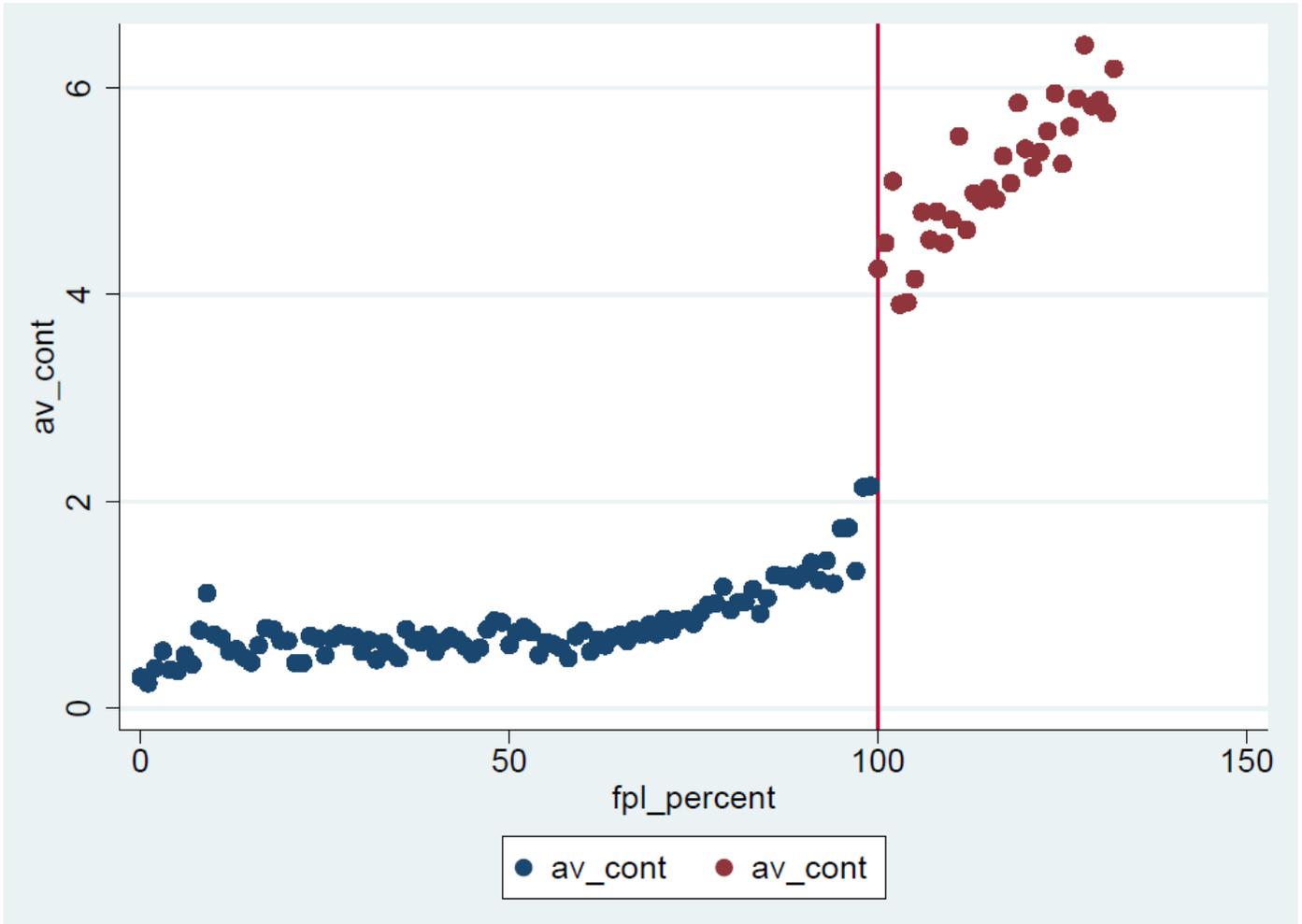


Figure 4.6b Contribution Amount and FPL: RDPlot

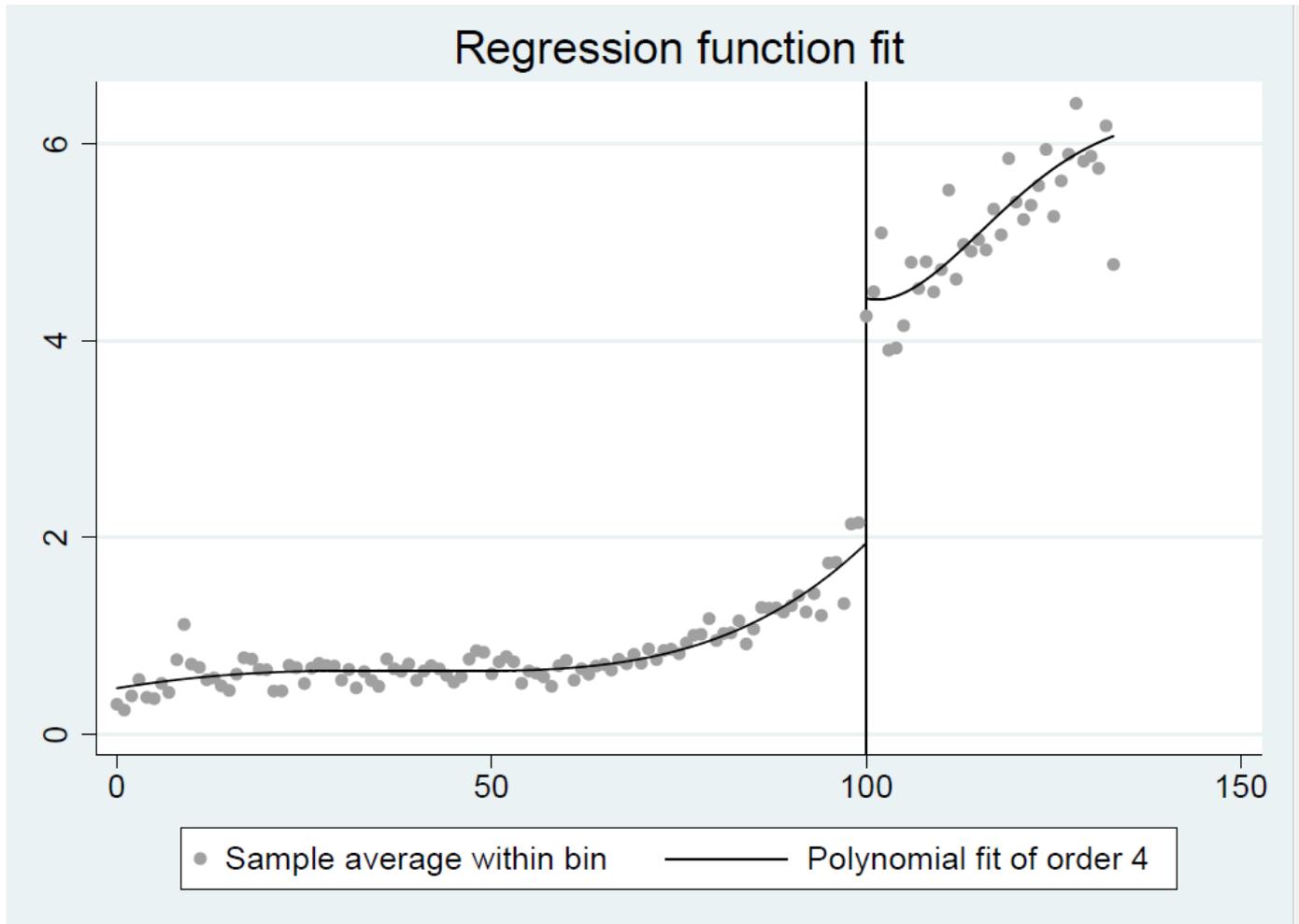


Figure 4.7 Likelihood of Copayment and FPL

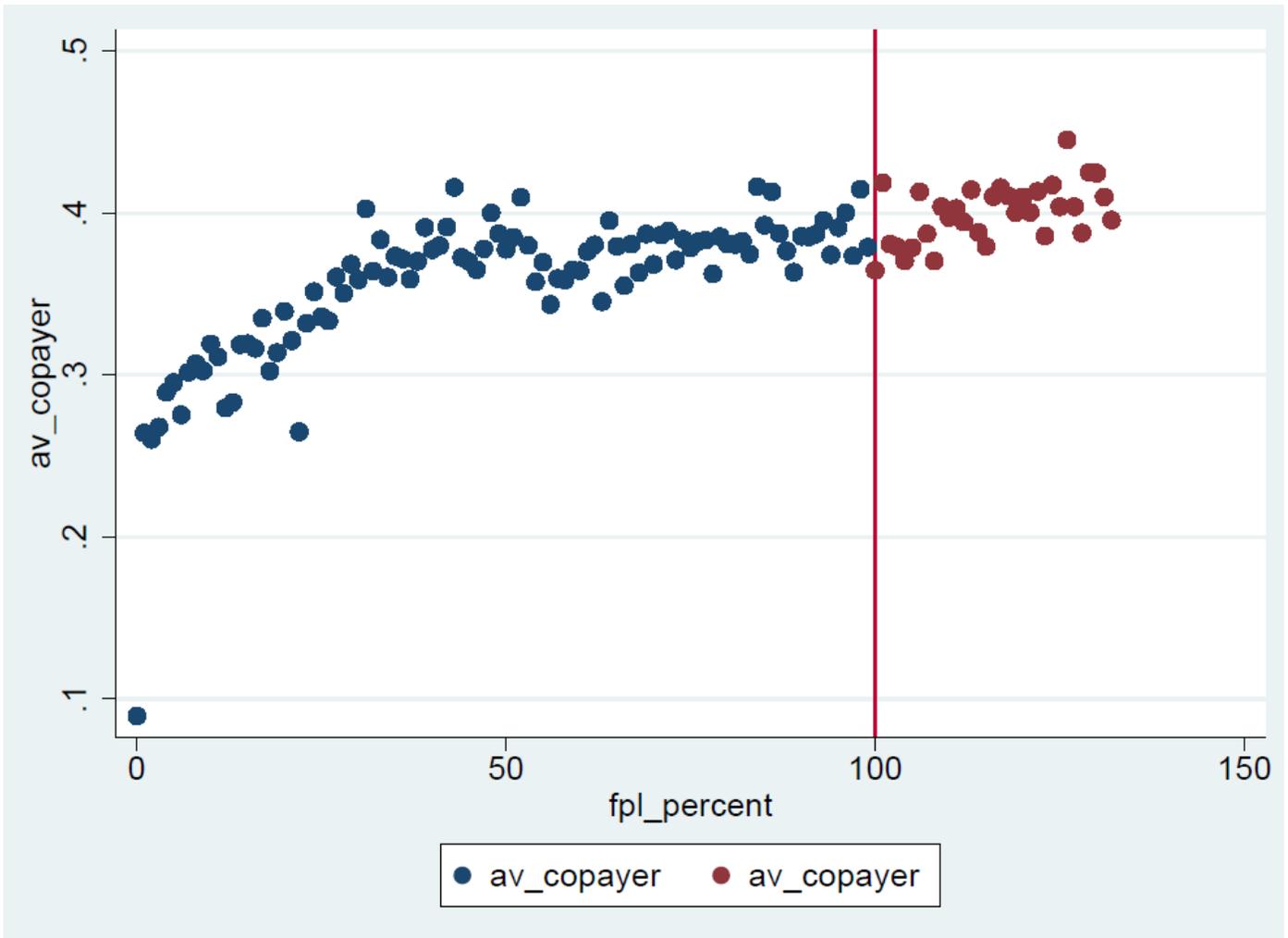


Figure 4.7a Copayment Amount and FPL

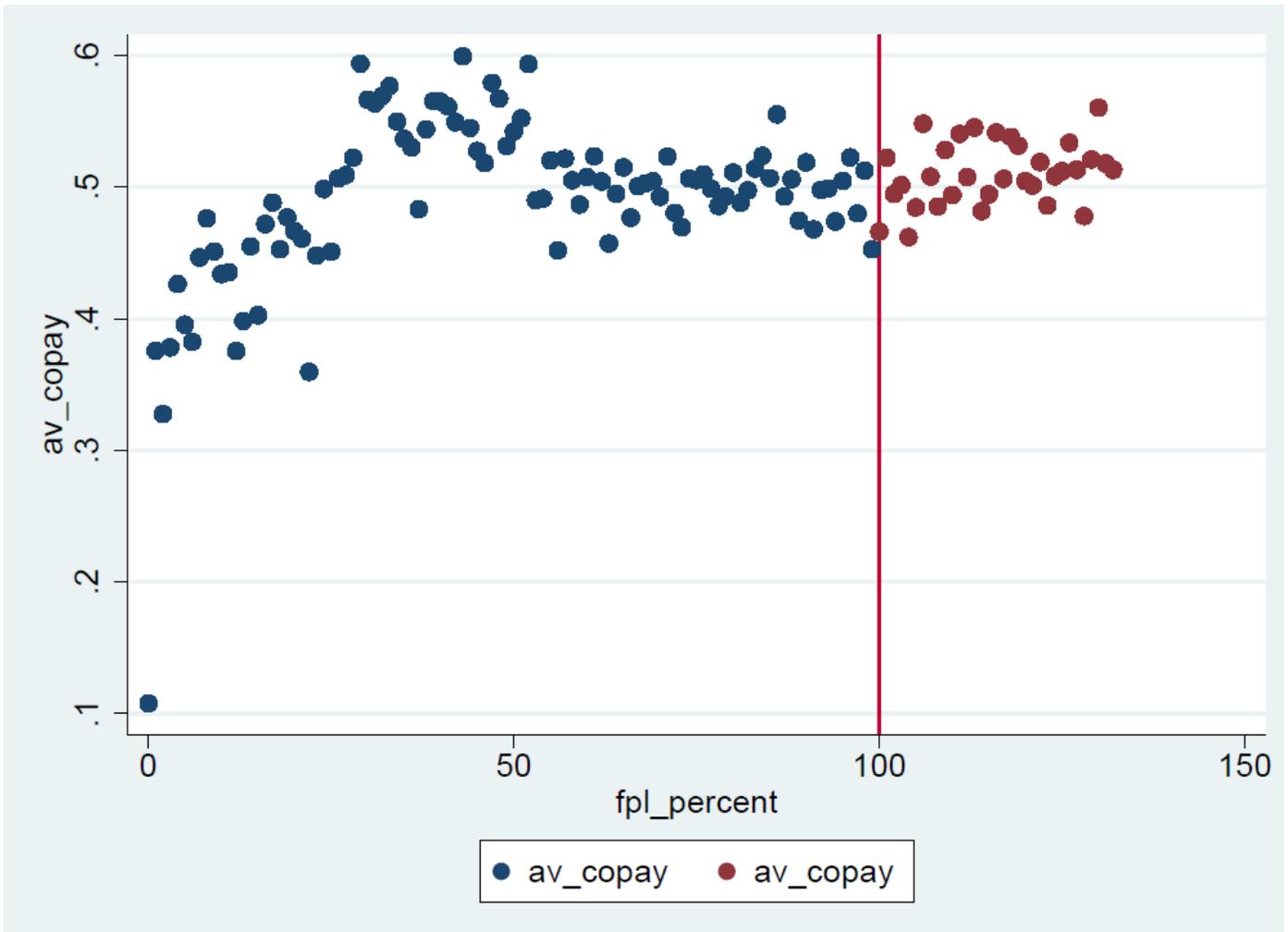


Figure 4.8 Likelihood of Disenrollment by FPL

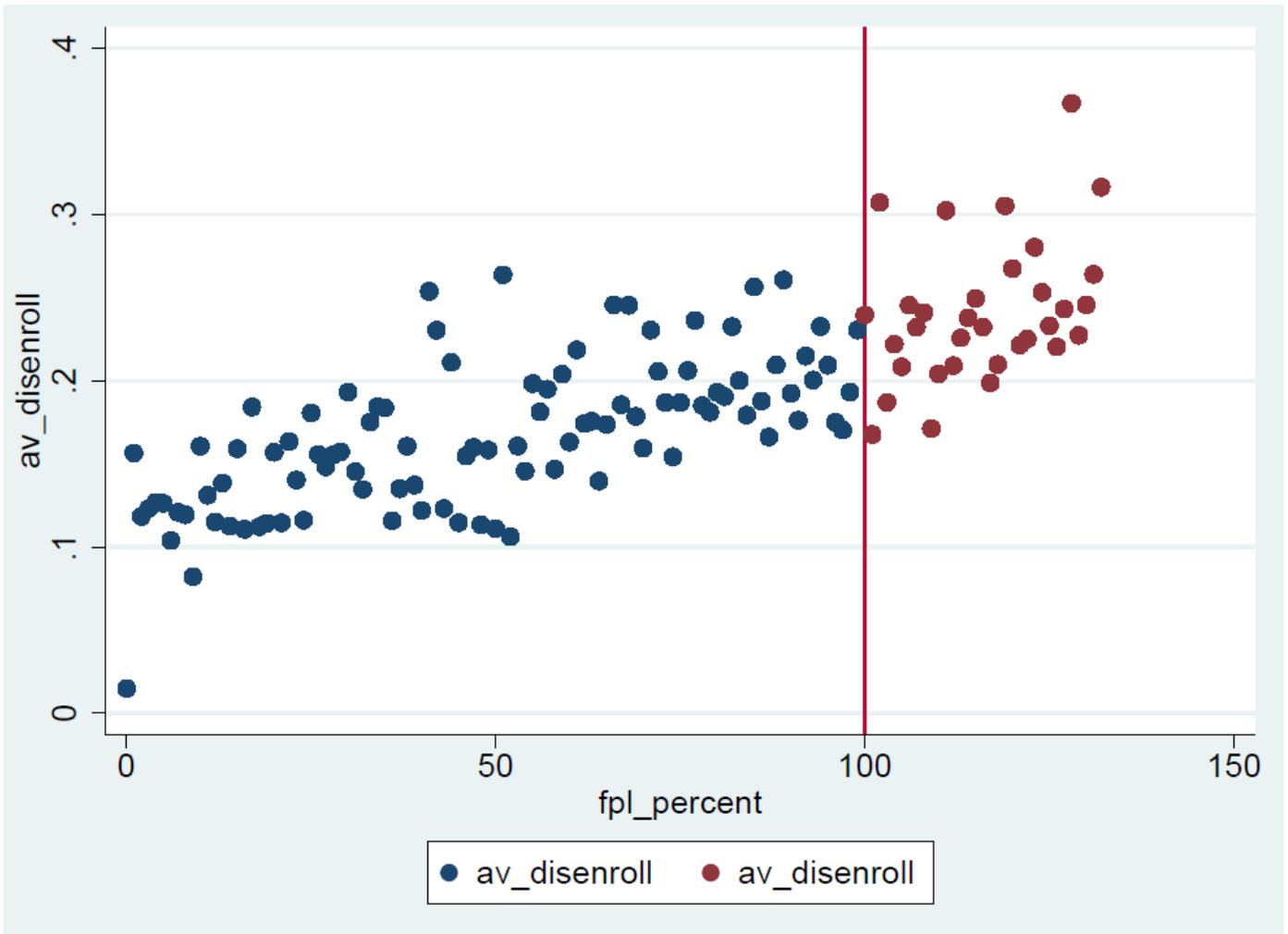


Figure 4.8a Likelihood of Disenrollment, FPL in bins of 7

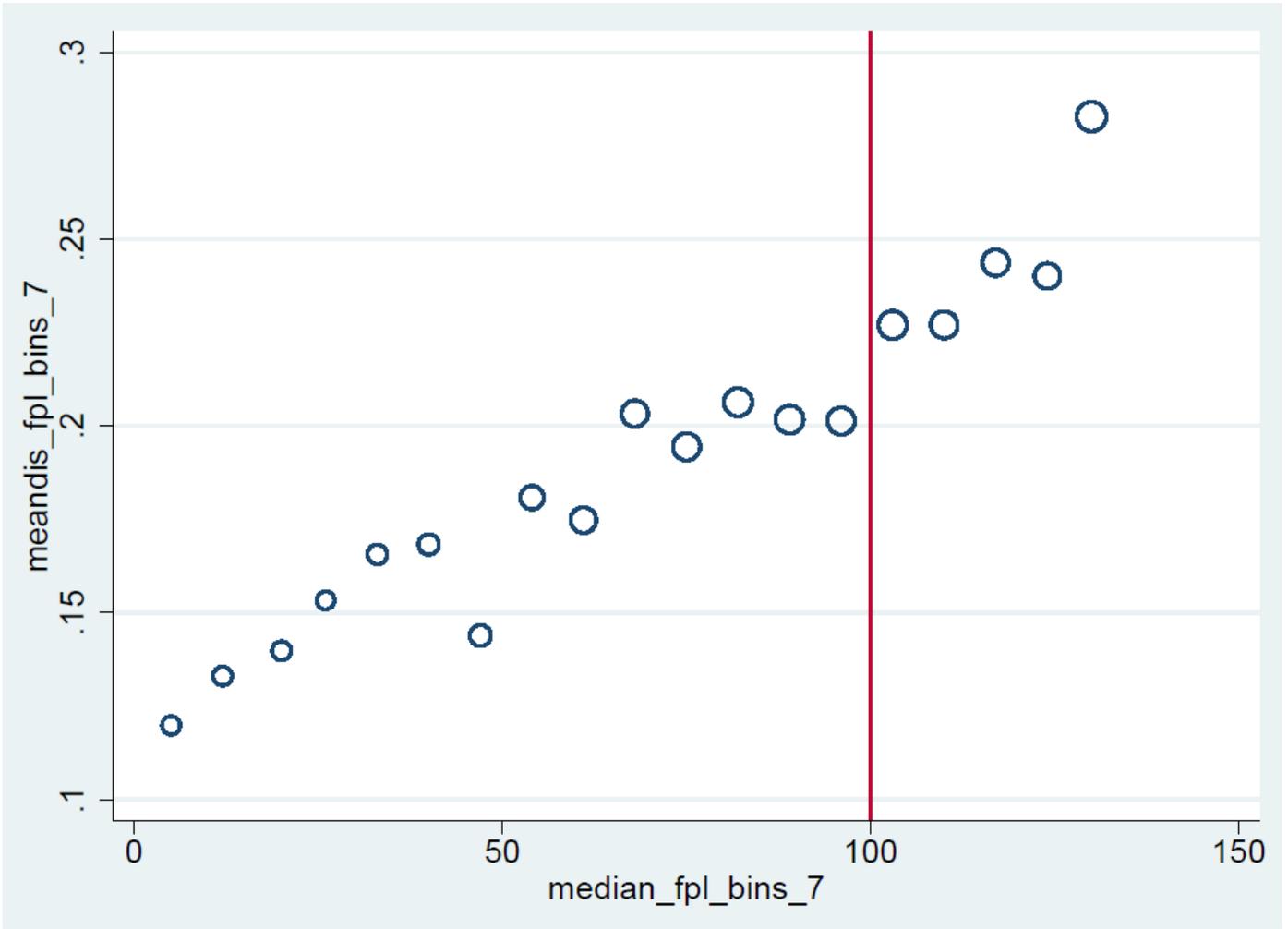


Figure 4.8b Likelihood of Disenrollment, FPL in bins of 5

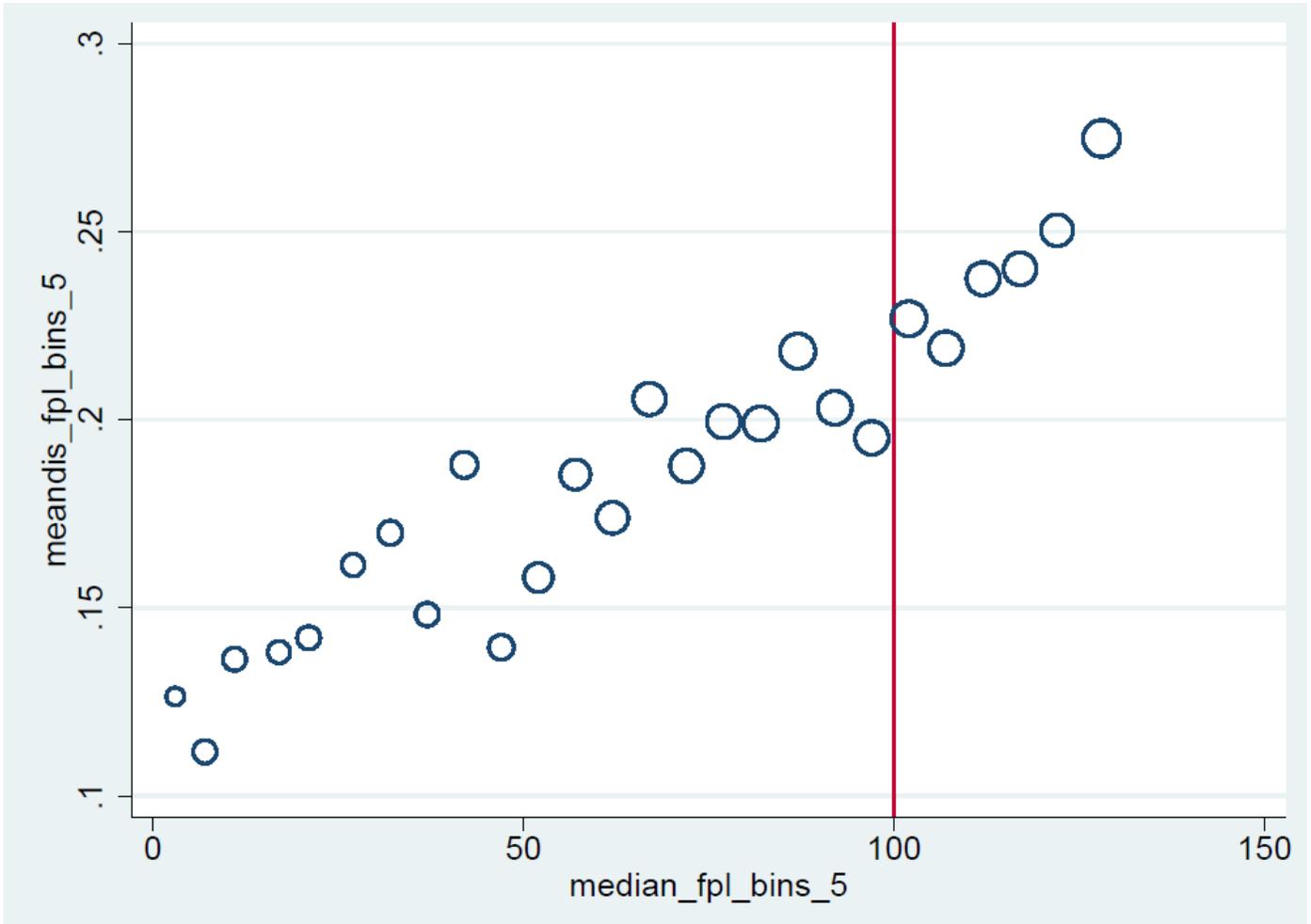


Figure 4.8c Likelihood of Disenrollment, FPL in bins of 4

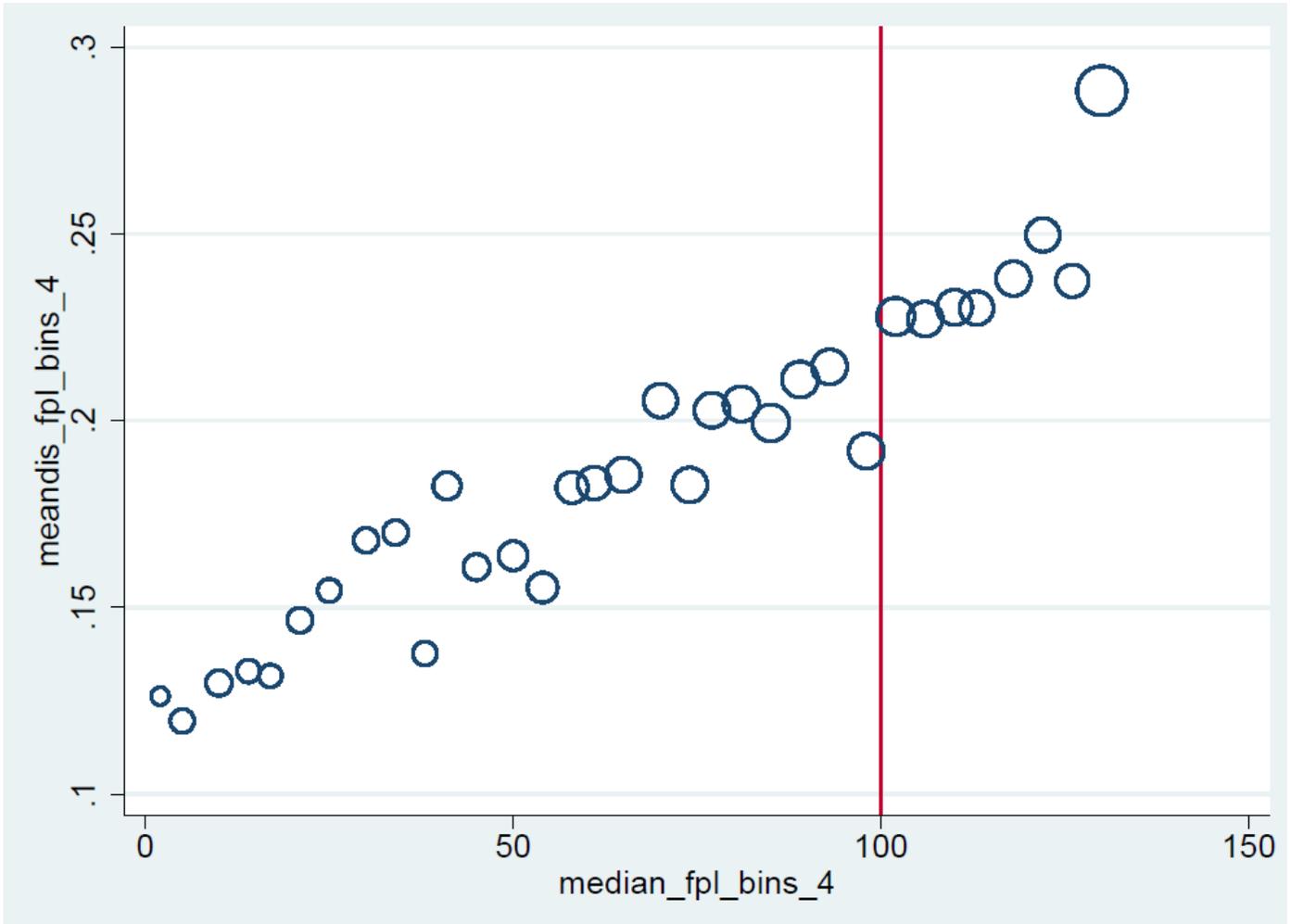


Figure 4.9 RD Plot Sharp, Mean FPL Percent

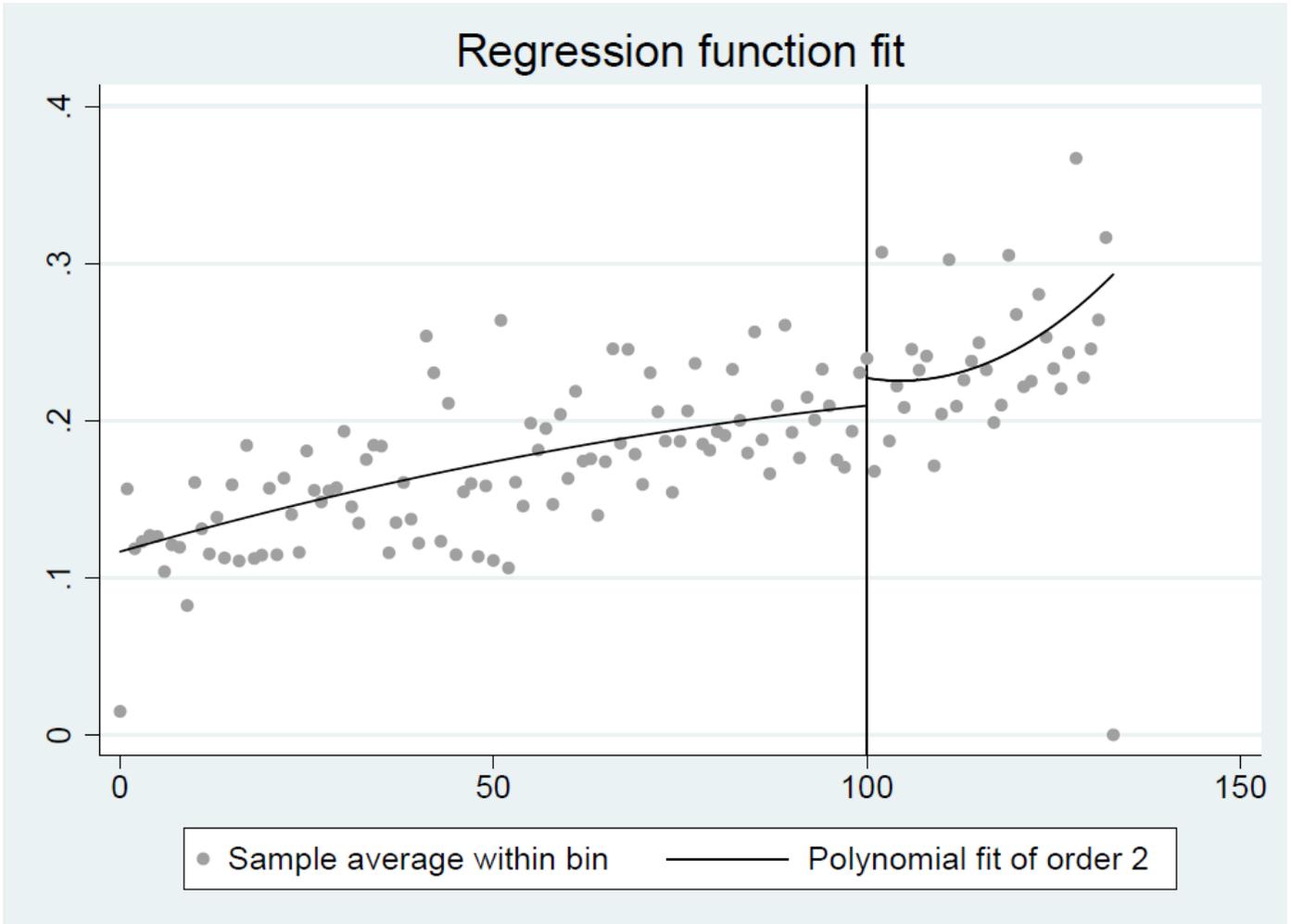


Figure 4.9a RD Plot on minimum reported FPL

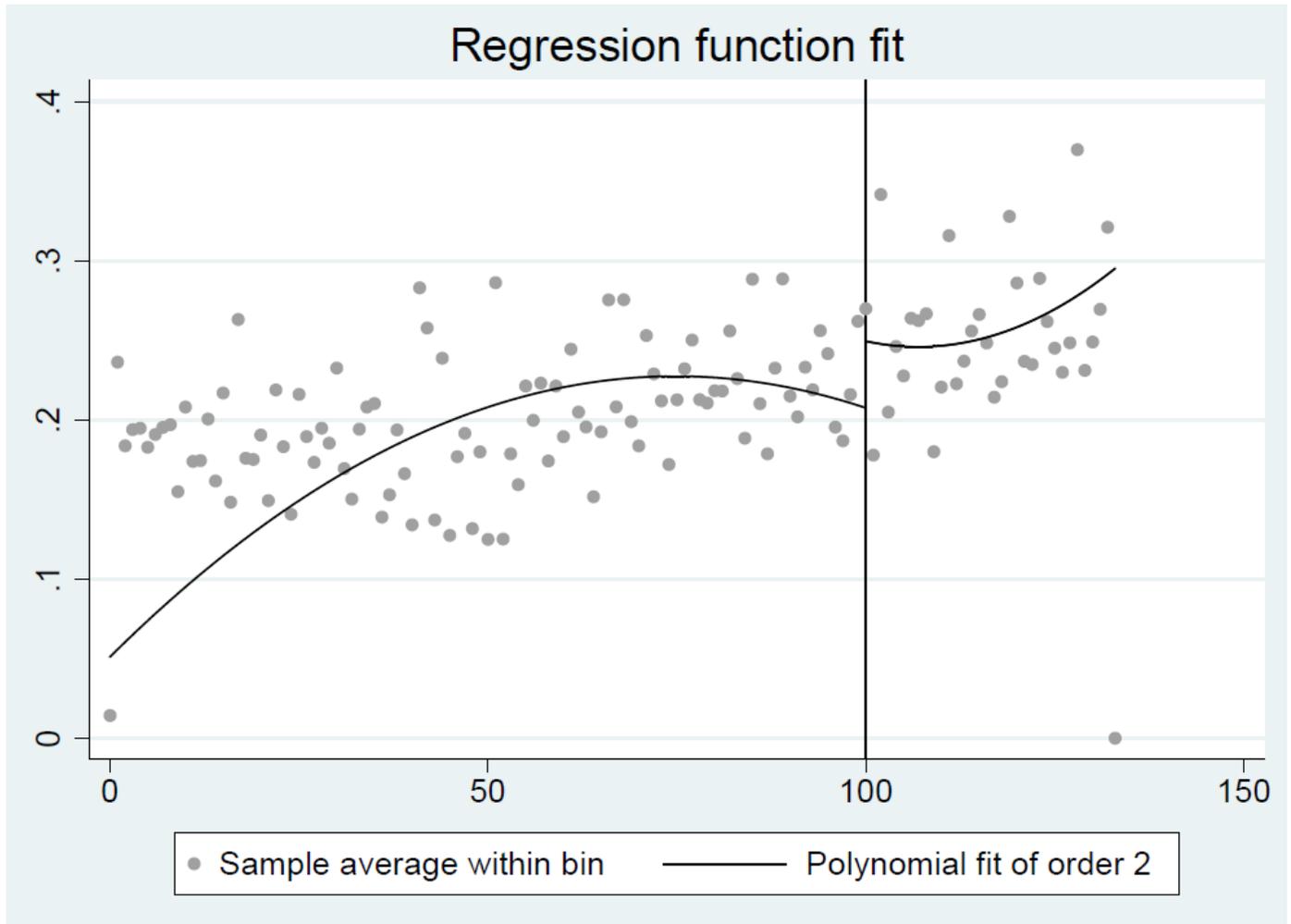


Figure 4.10 RD Plot of Disenrollment for Bottom Half of Spenders (including \$0; 1st 7 months enrollment)

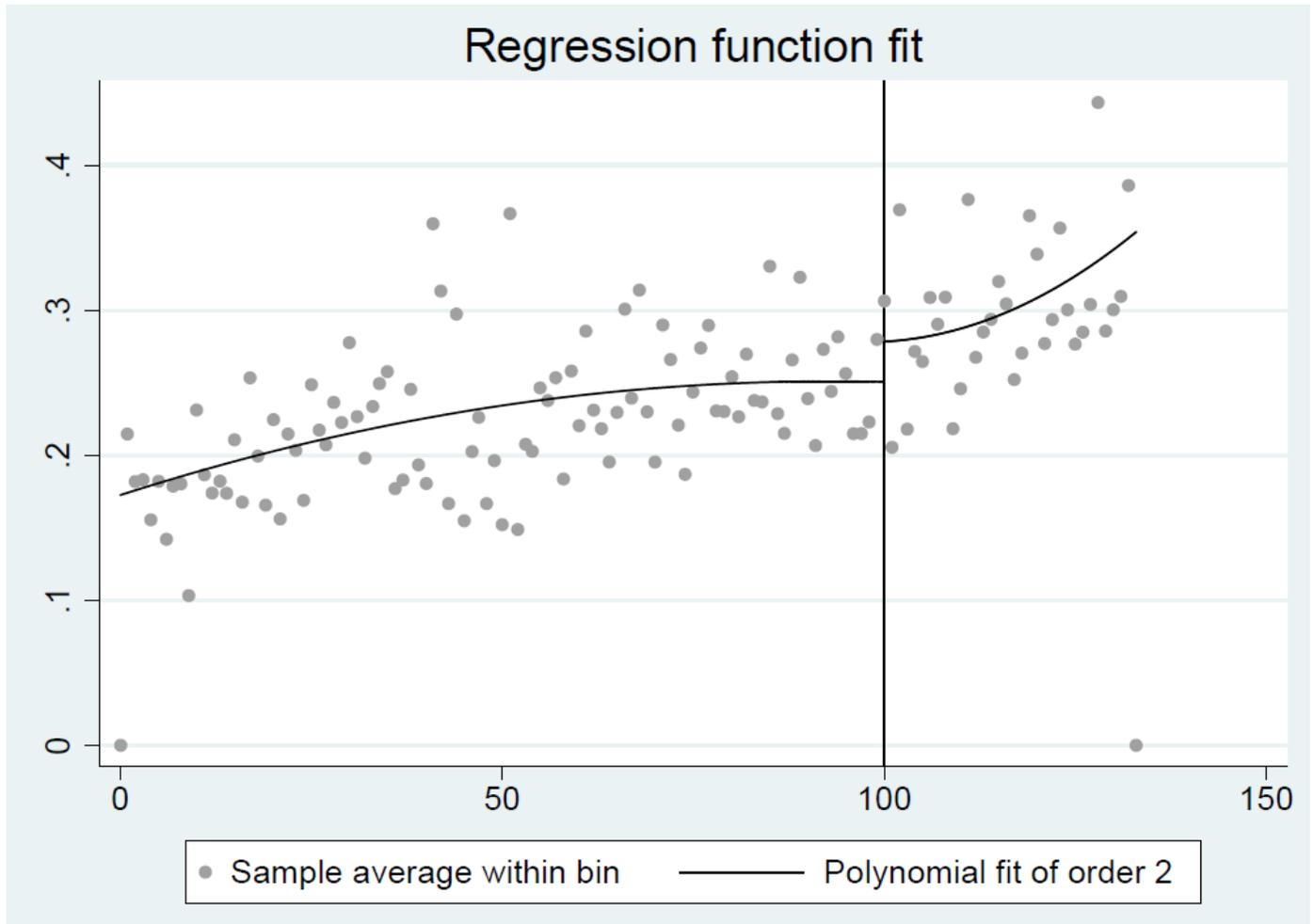


Figure 4.10a RD Plot of Disenrollment for Top Half of Spenders (no truncation; 1st 7 months enrollment)

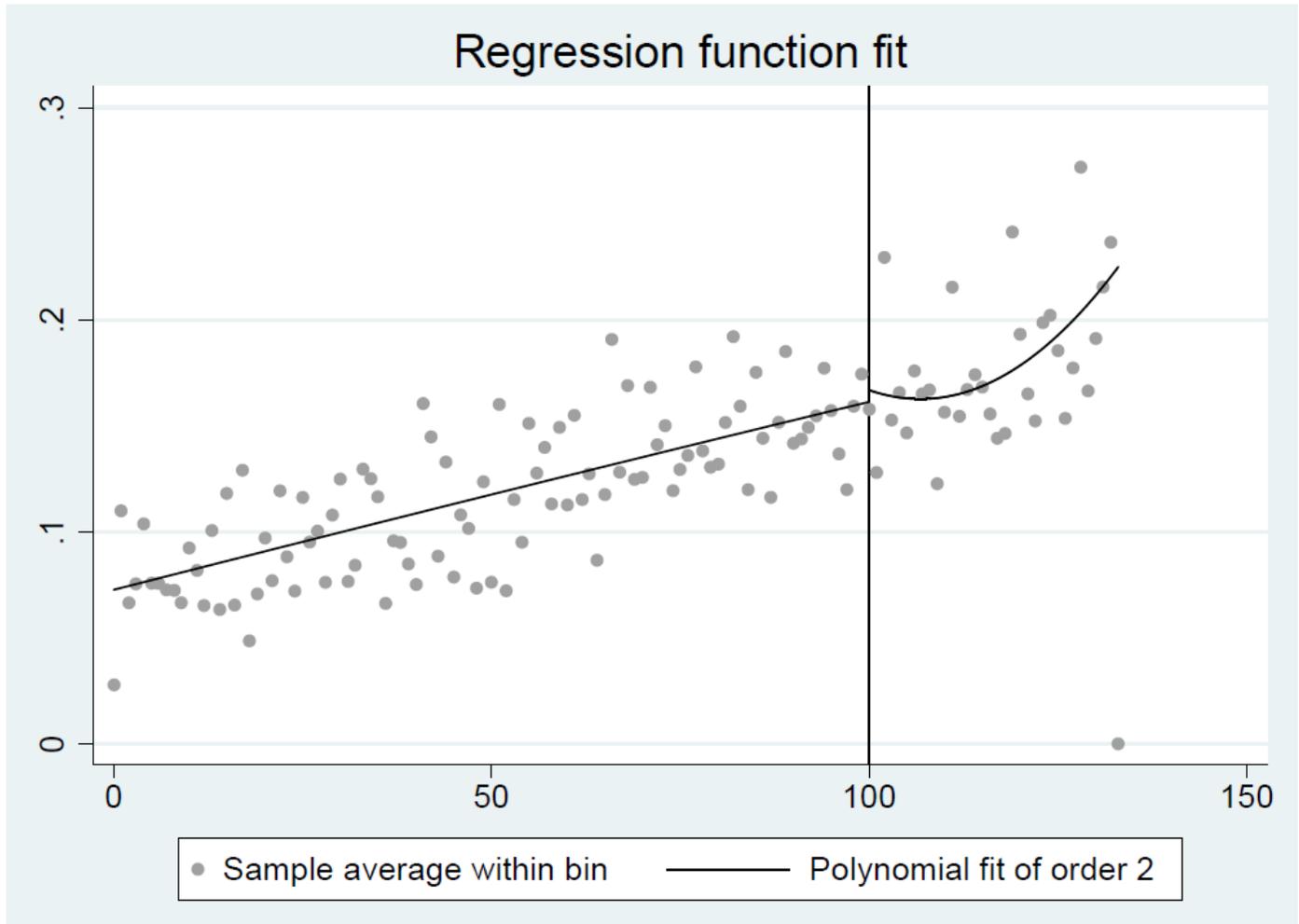


Figure 4.11 RD Plot of Disenrollment for People with No Chronic Disease Claims (1st 7months enrollment)



Figure 4.11a RD Plot of Disenrollment for People with Any Chronic Disease Claims (1st 7months enrollment)

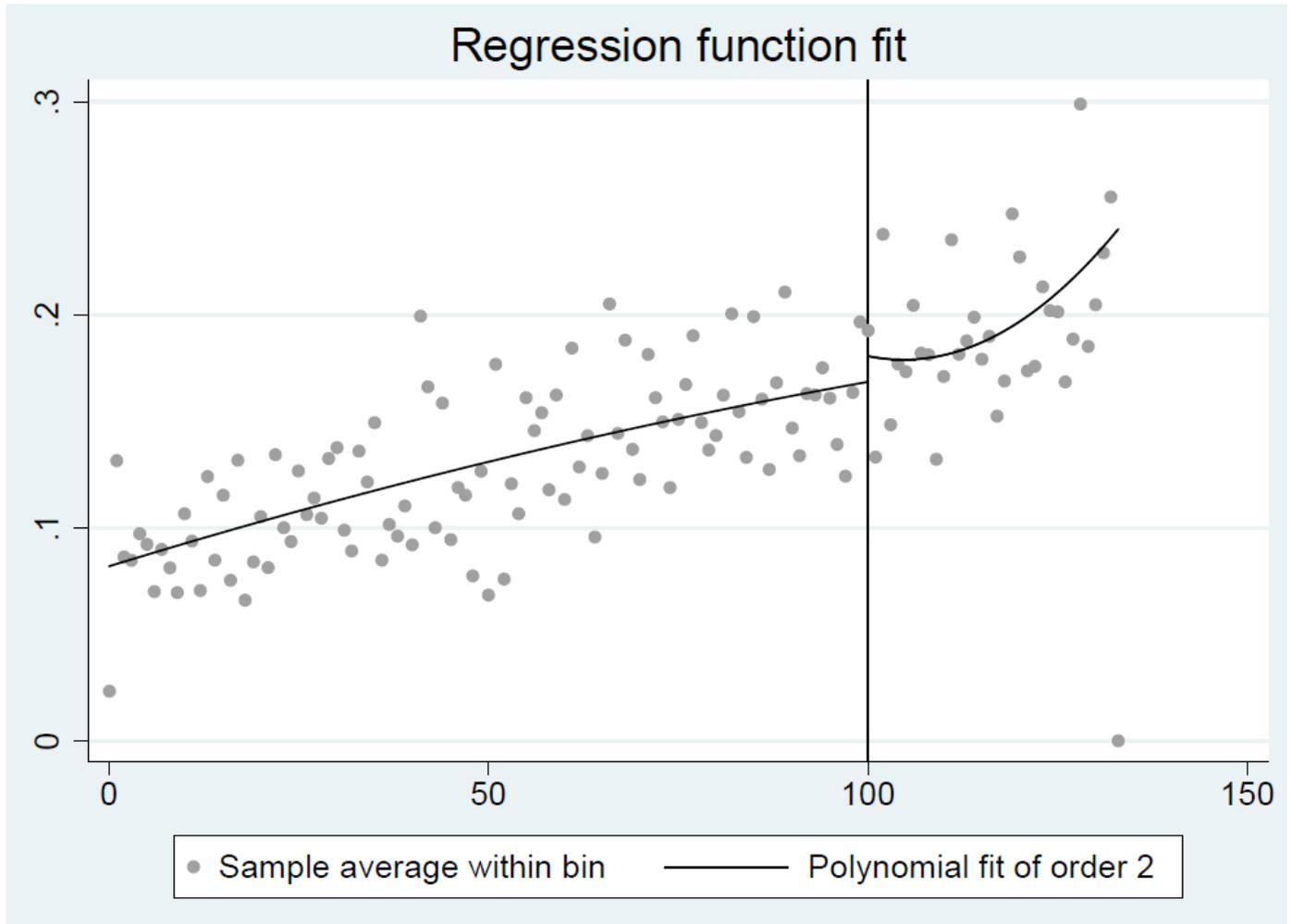


Figure 4.12 Sensitivity Check: Qfit and Scatter of Age on FPL

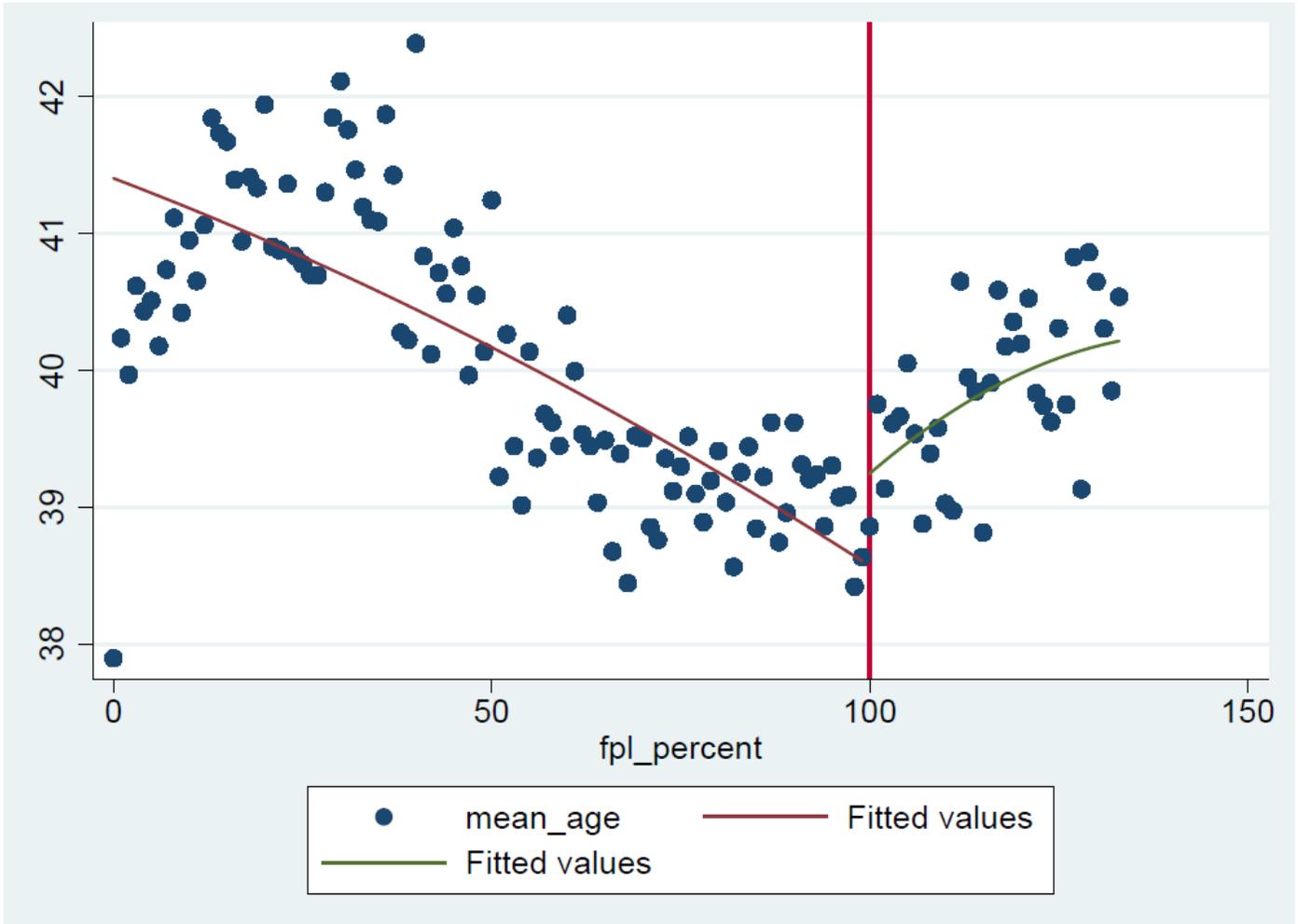


Figure 4.12a Sensitivity Check: RD Plot of Age on FPL

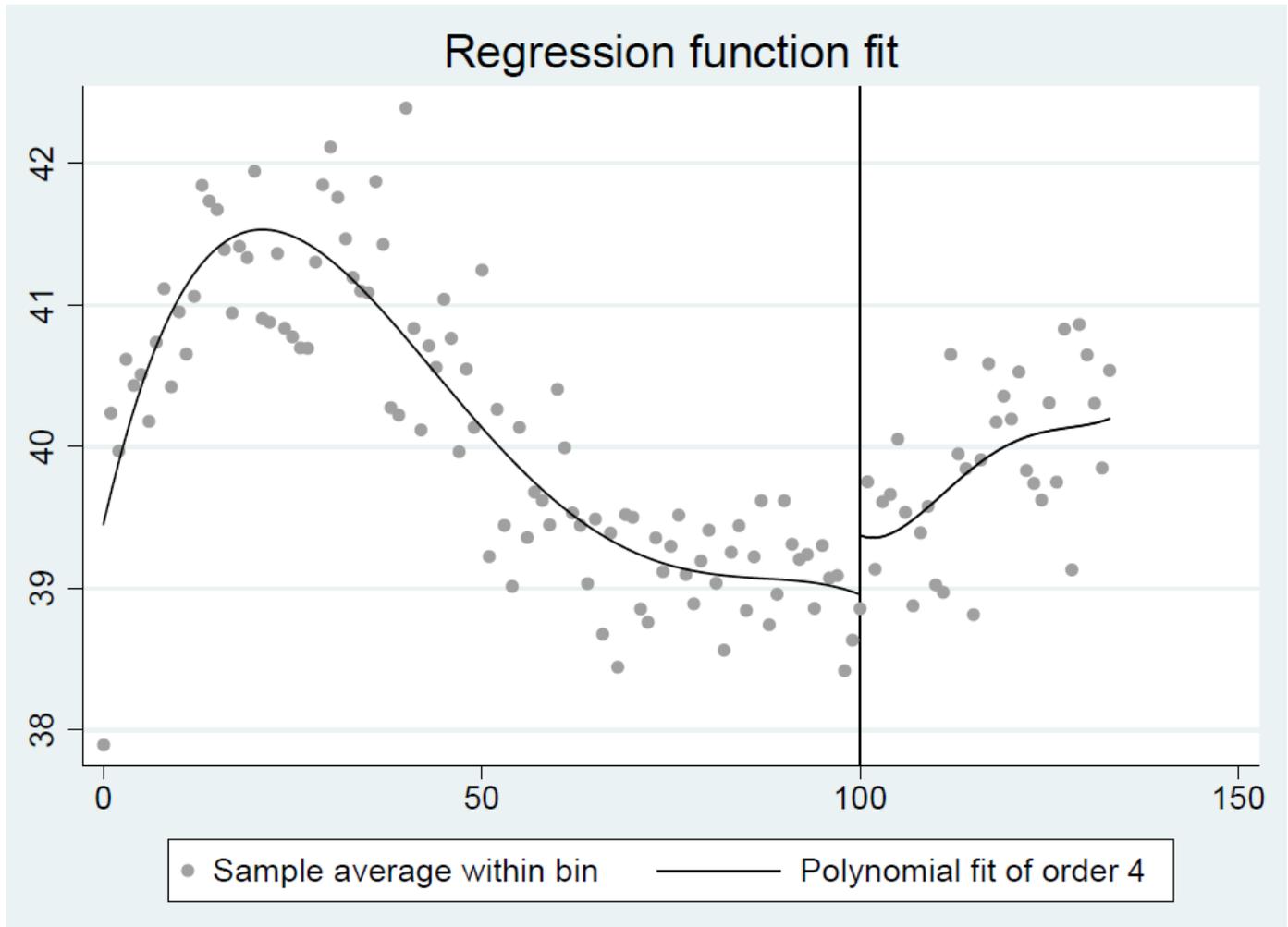


Figure 4.13 Sensitivity Check: Qfit and Scatter of Female on FPL

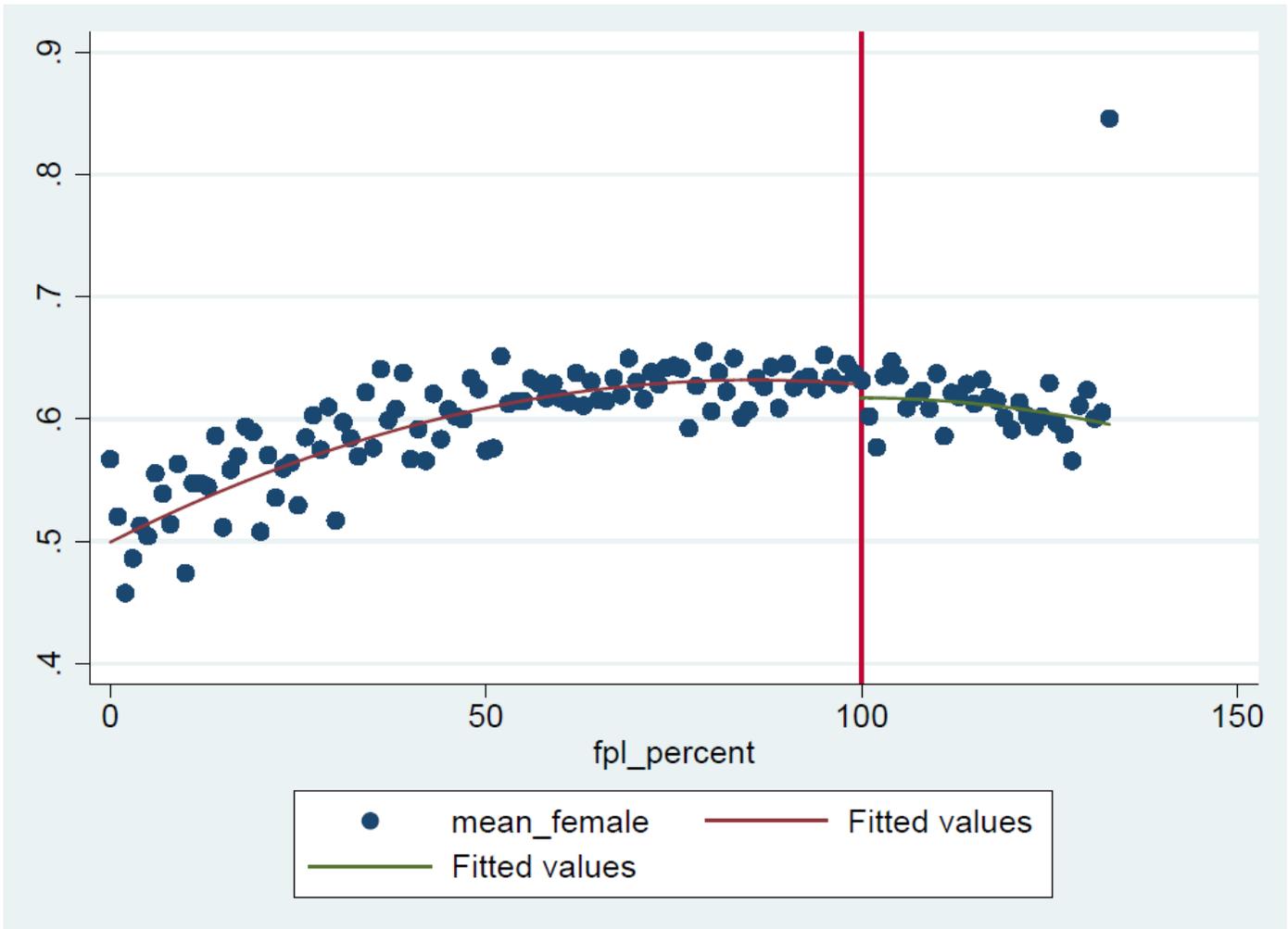


Figure 4.13a Sensitivity Check: RD Plot of Female on FPL

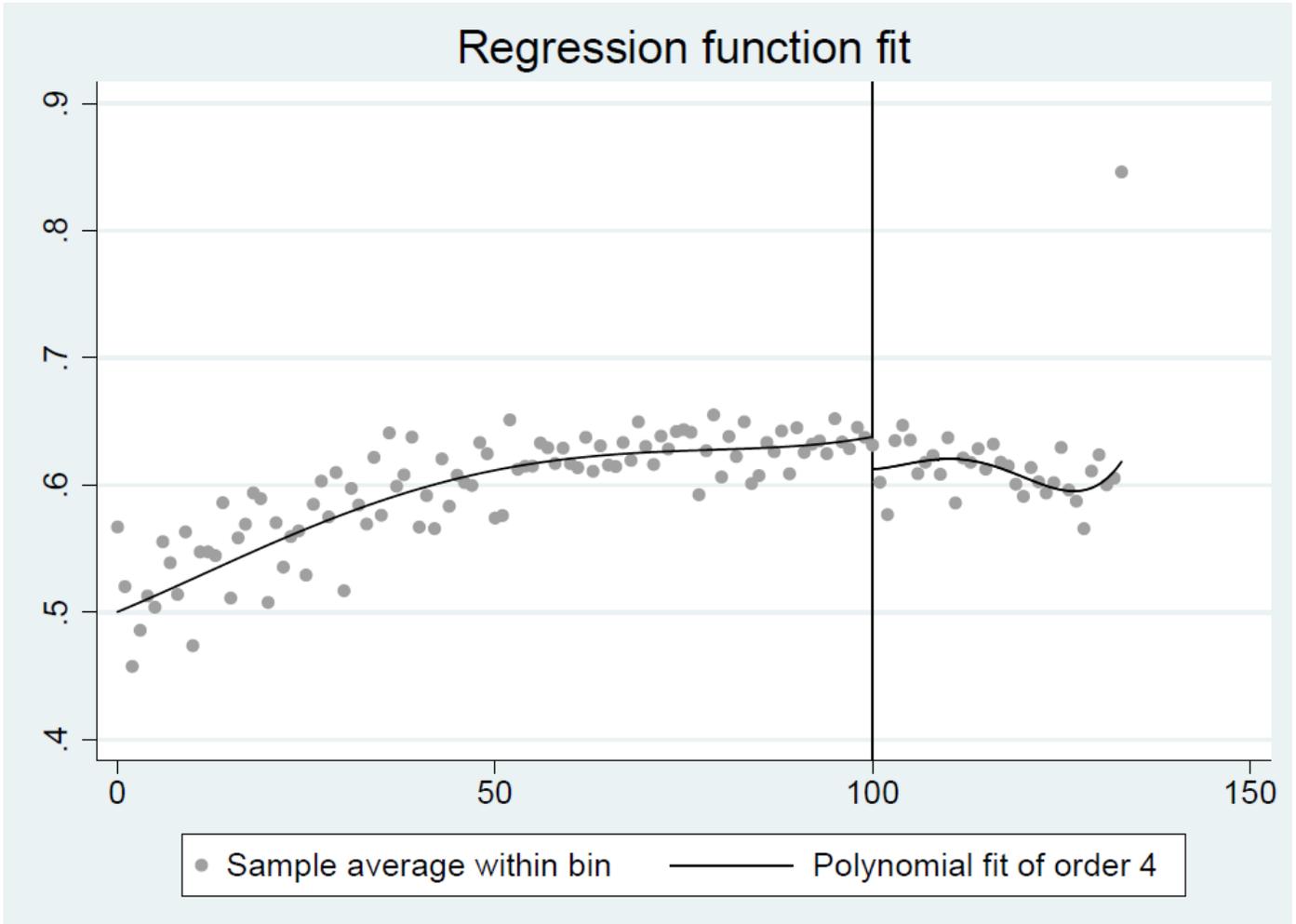


Figure 4.14 Scatter Plot, Contribution Percentage and Average Contribution Amount, Below Median Spending

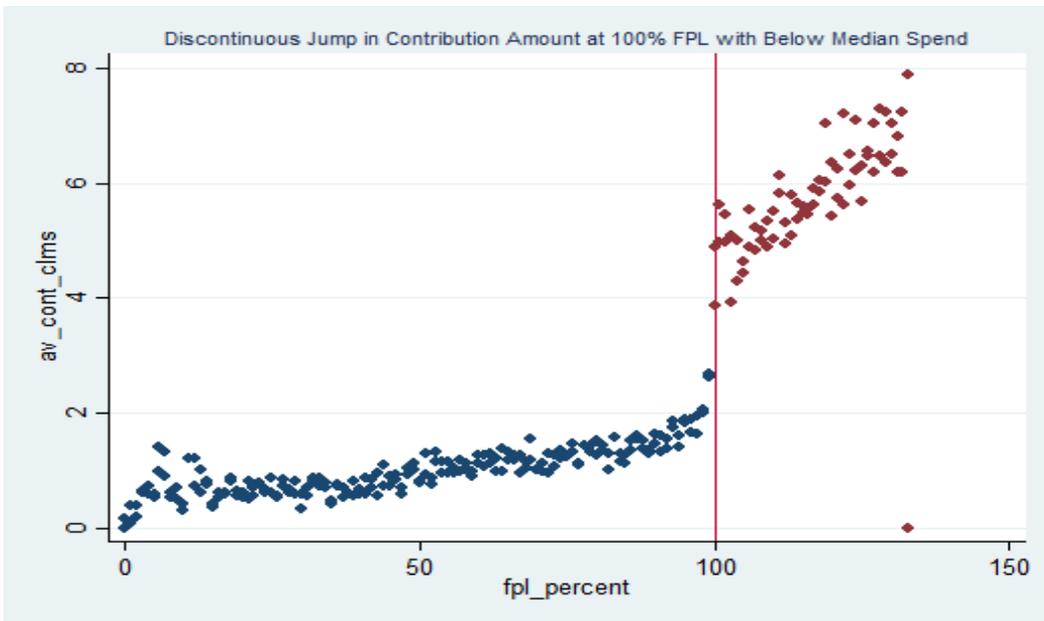
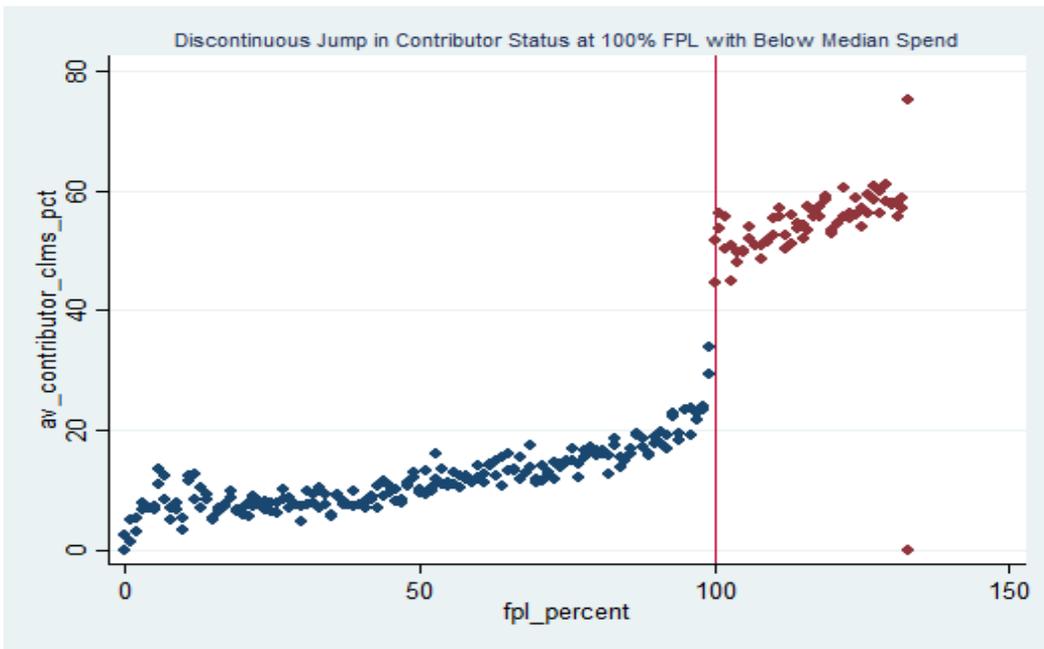


Figure 4.15 Scatter Plot, Contribution Percentage and Average Contribution Amount, Above Median Spending

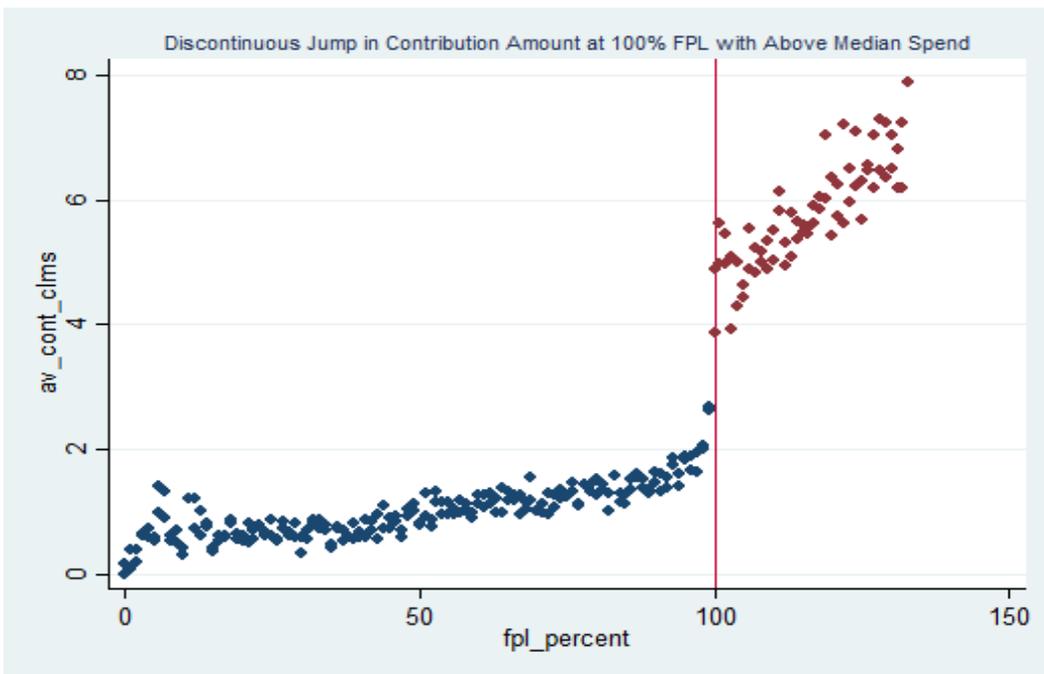
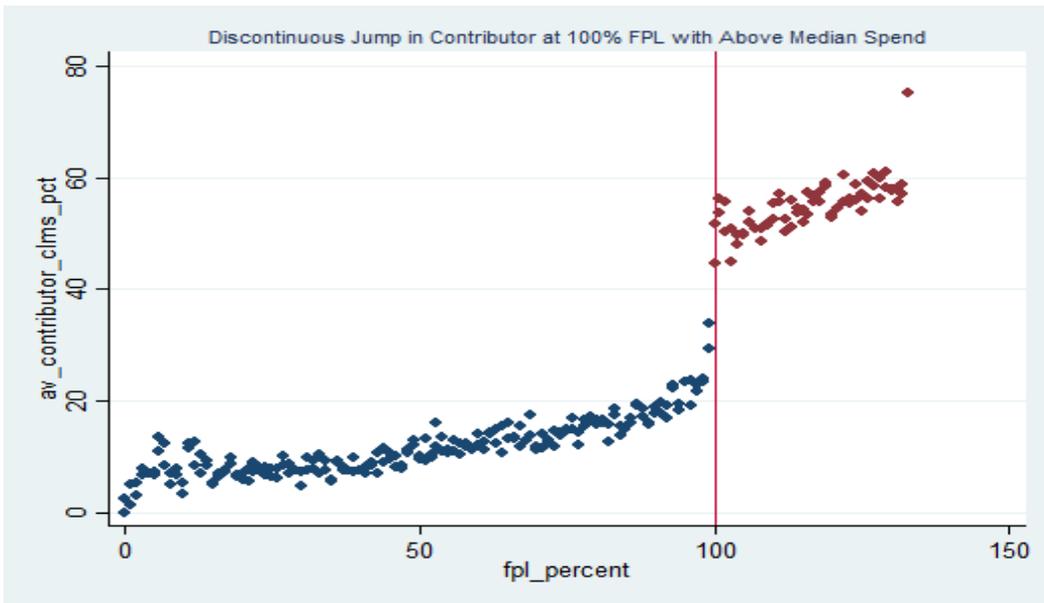


Figure 4.16 Scatter Plot, Contribution Percentage and Average Contribution Amount, No Chronic Disease Claims

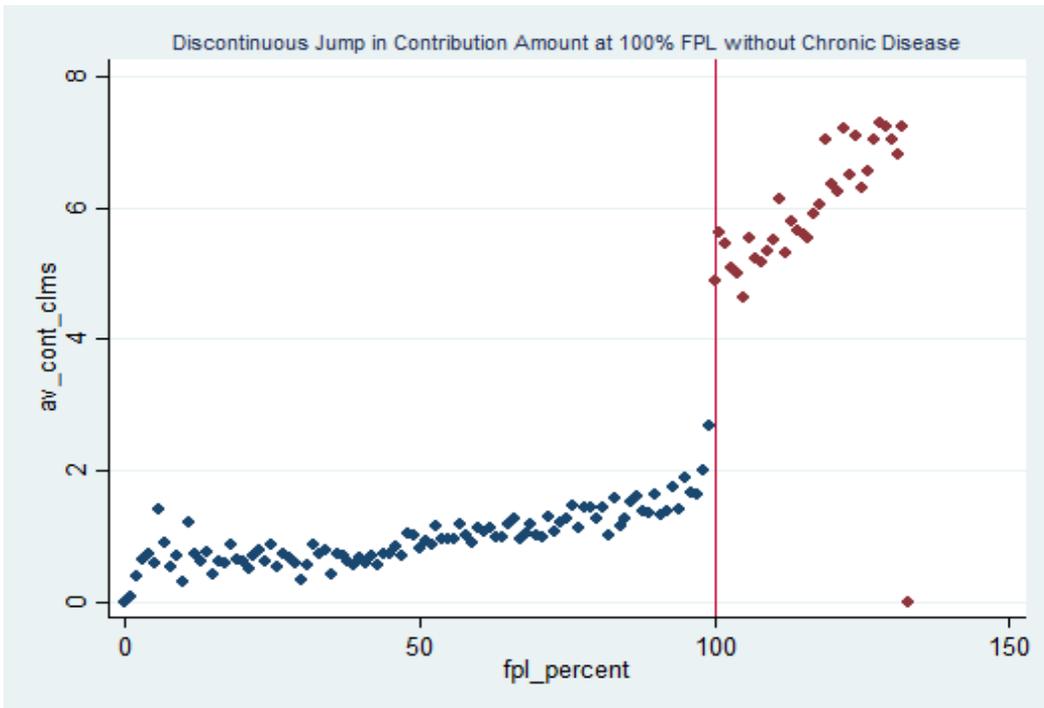
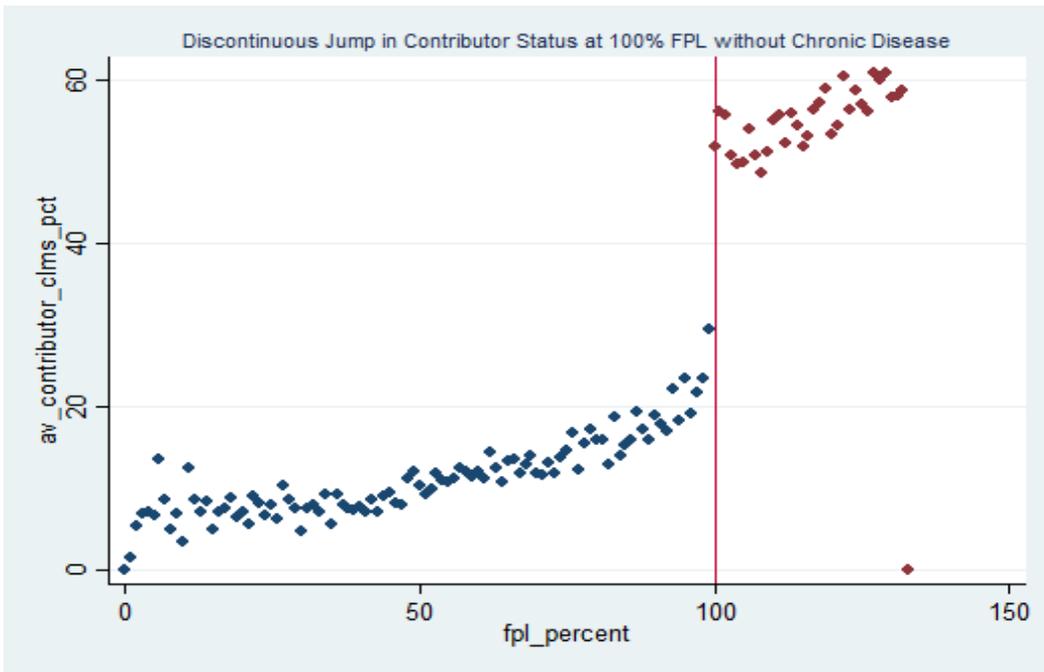


Figure 4.17 Scatter Plot, Contribution Percentage and Average Contribution Amount, Chronic Disease Claims

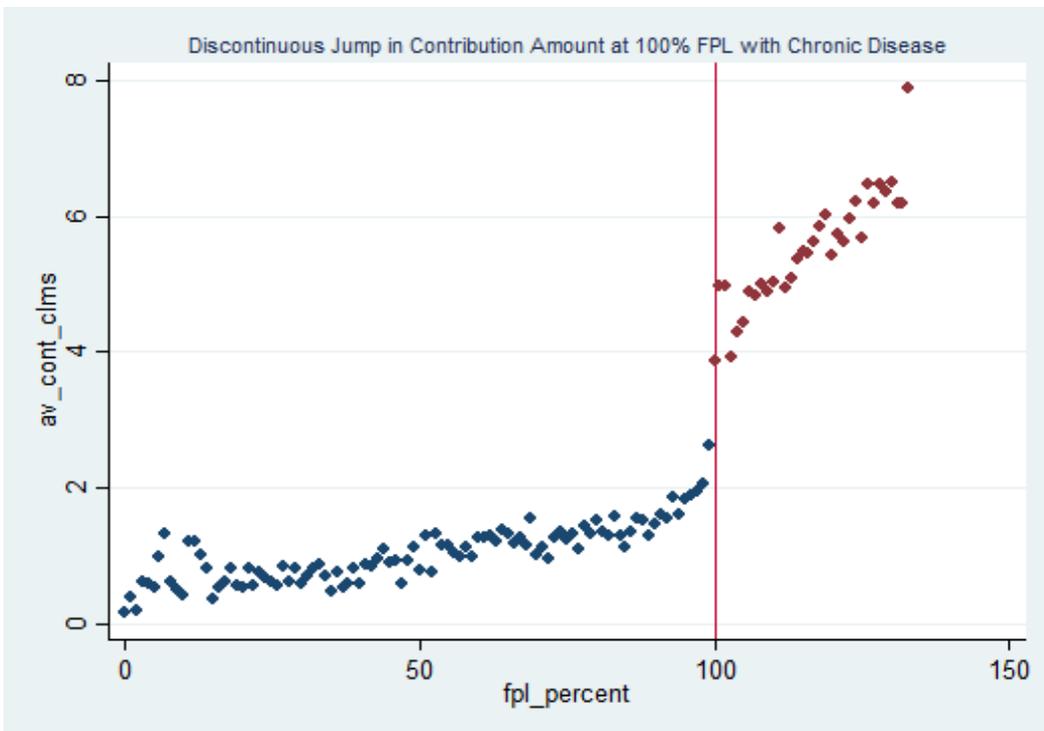
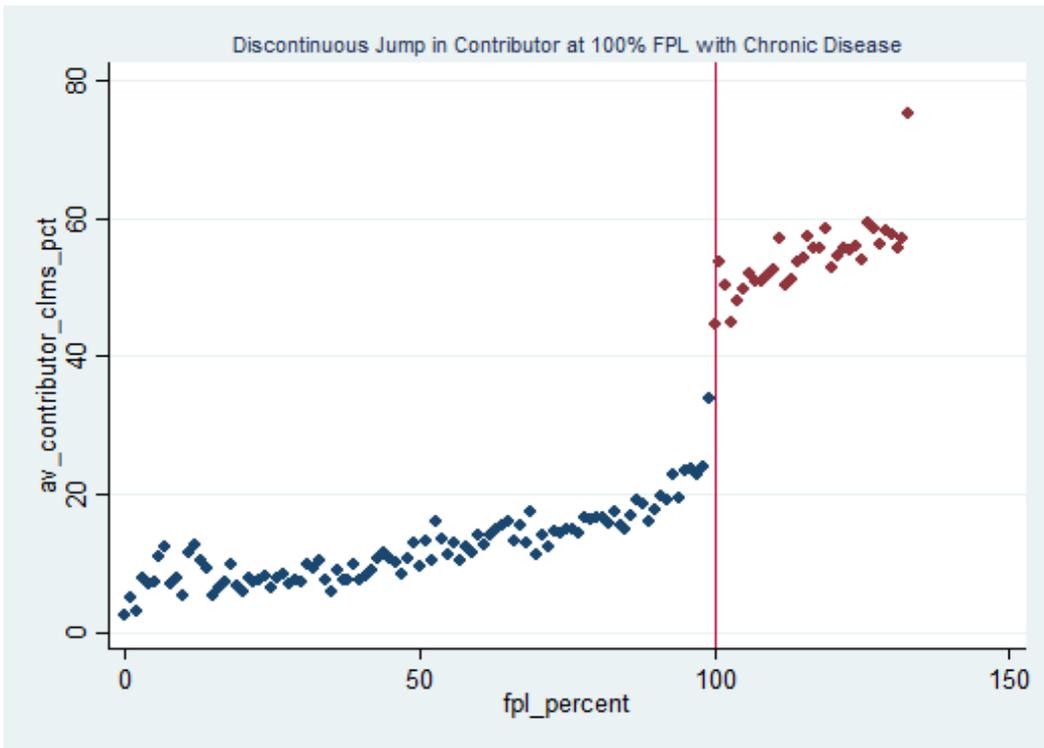


Figure 4.18 Disenrollment Percent by FPL with cutoffs at FPL 20% to FPL 115%, MSE-optimal bandwidths, triangular kernel

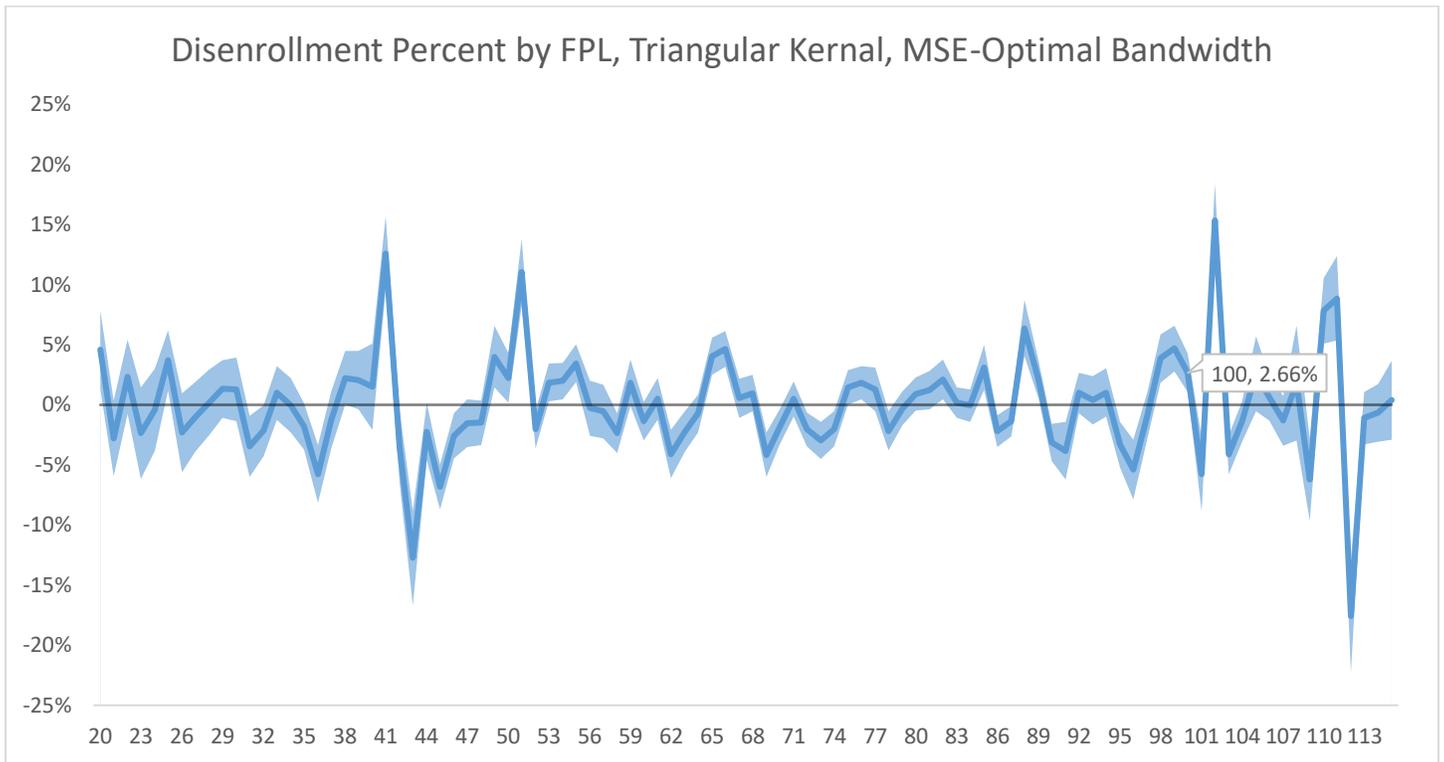


Figure 4.19 Disenrollment Percent by FPL with cutoffs at FPL 20% to FPL 115%, MSE-optimal bandwidths, triangular kernel, Below and Above Median Spending

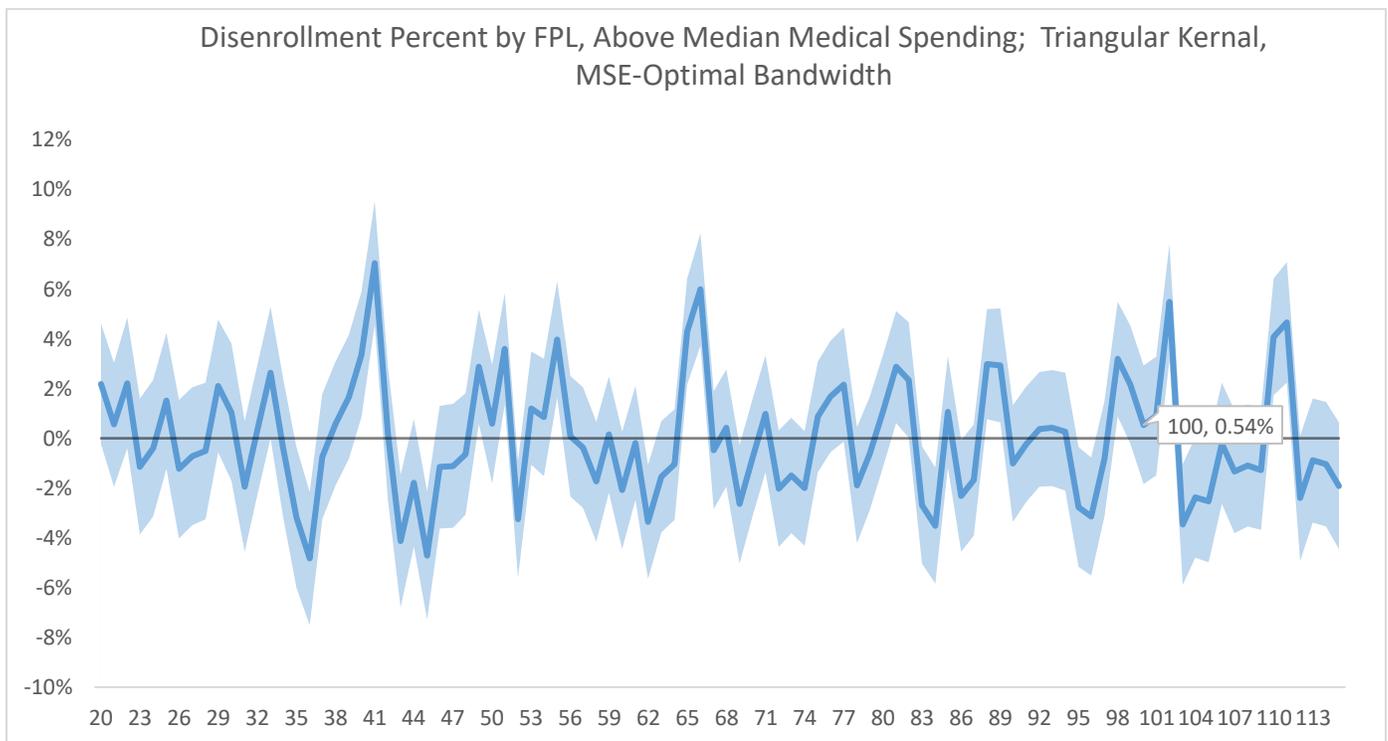
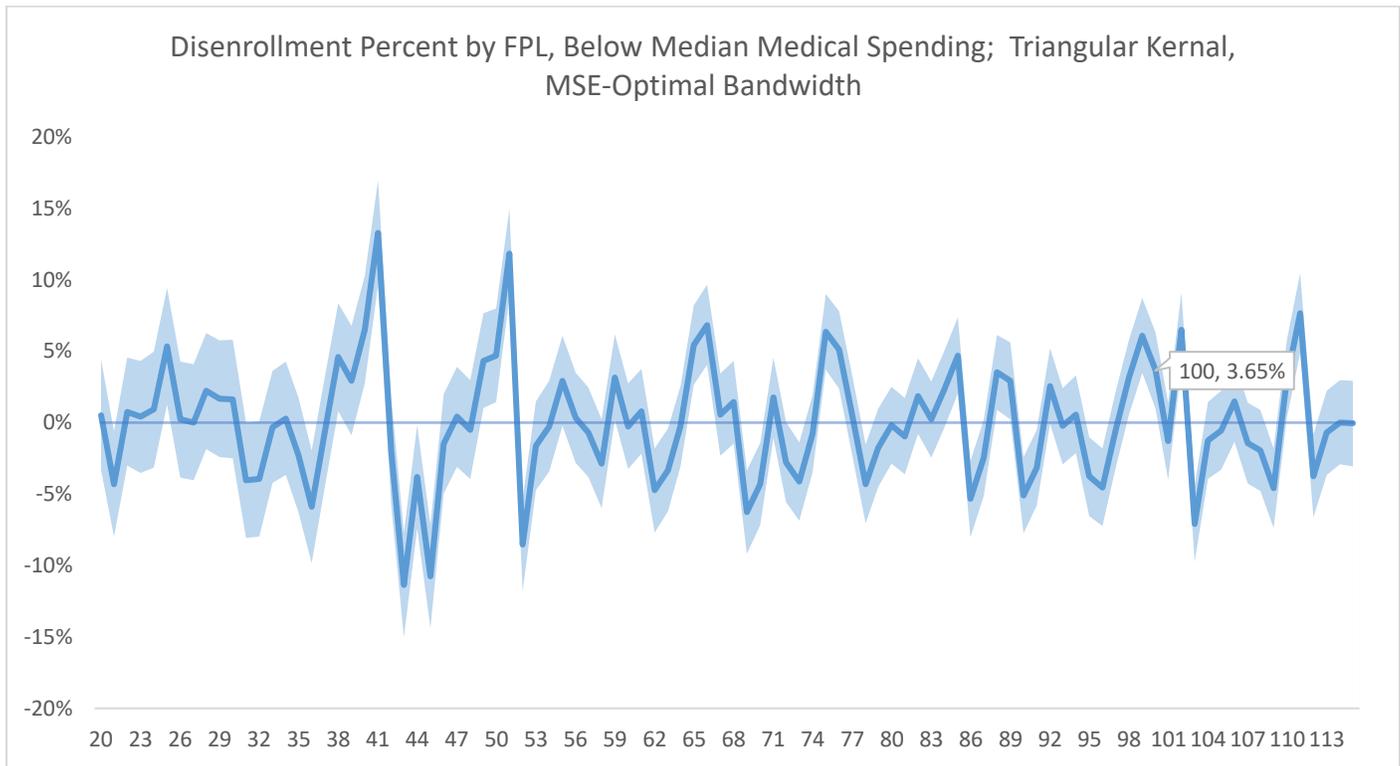


Figure 4.20 Disenrollment Percent by FPL with cutoffs at FPL 20% to FPL 115%, MSE-optimal bandwidths, triangular kernel, Chronic and No Chronic Diagnoses

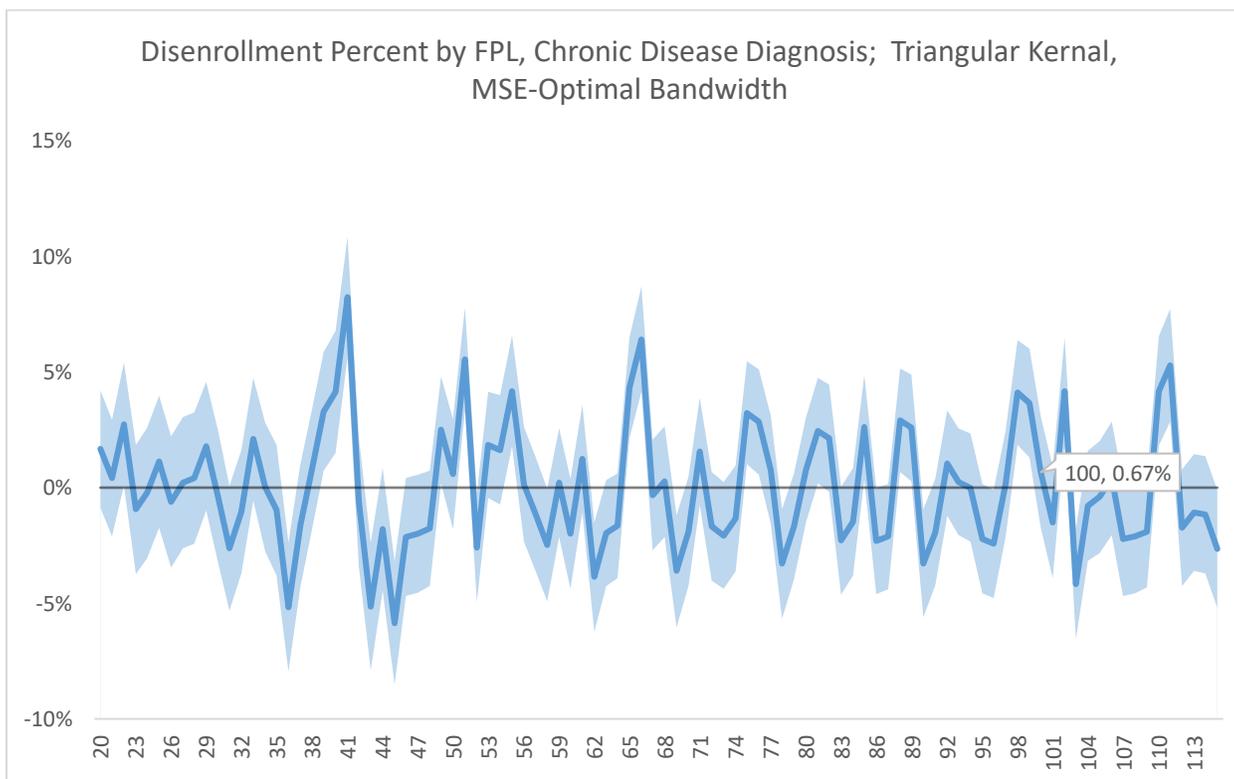
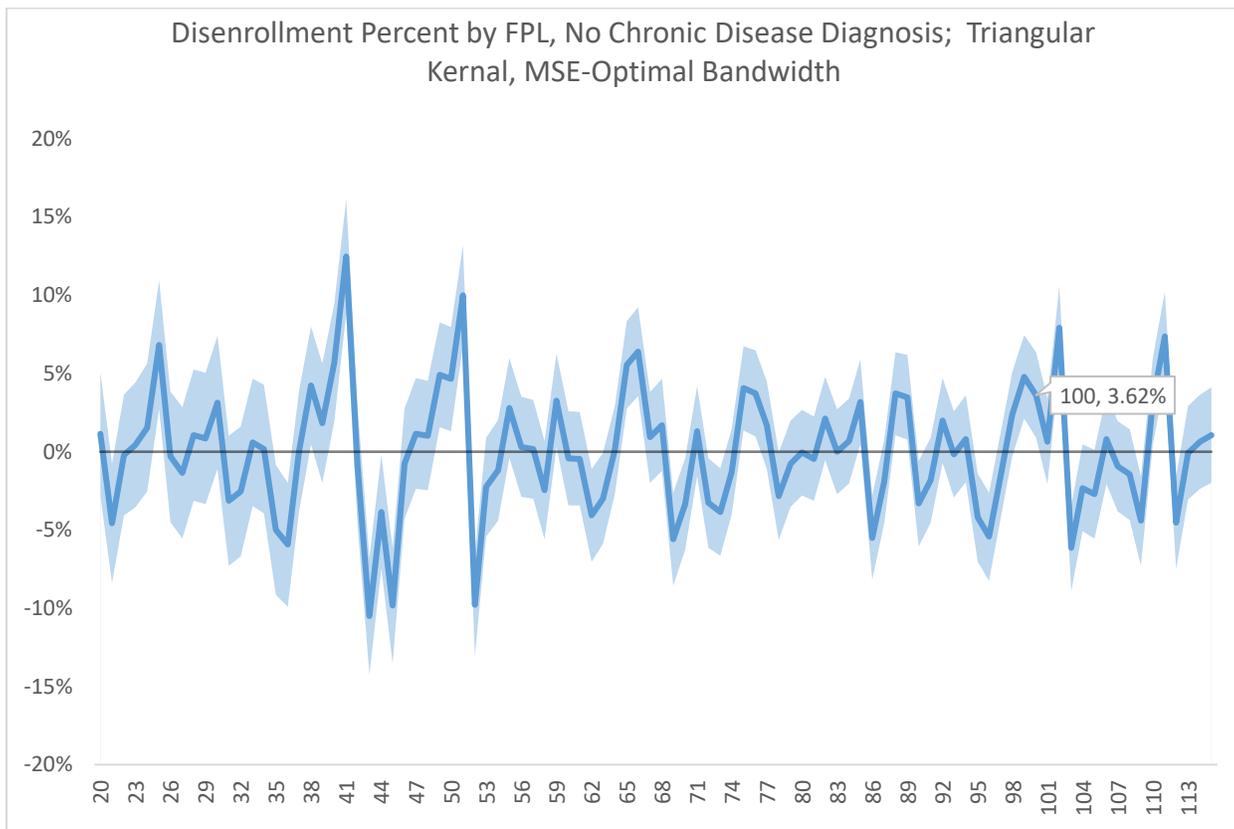


Figure 4.21 Overall density of number of months enrolled among disenrollers, all FPL and all Medicaid programs, sample of enrollees in HMP-MC or HMP-FFS >1 month

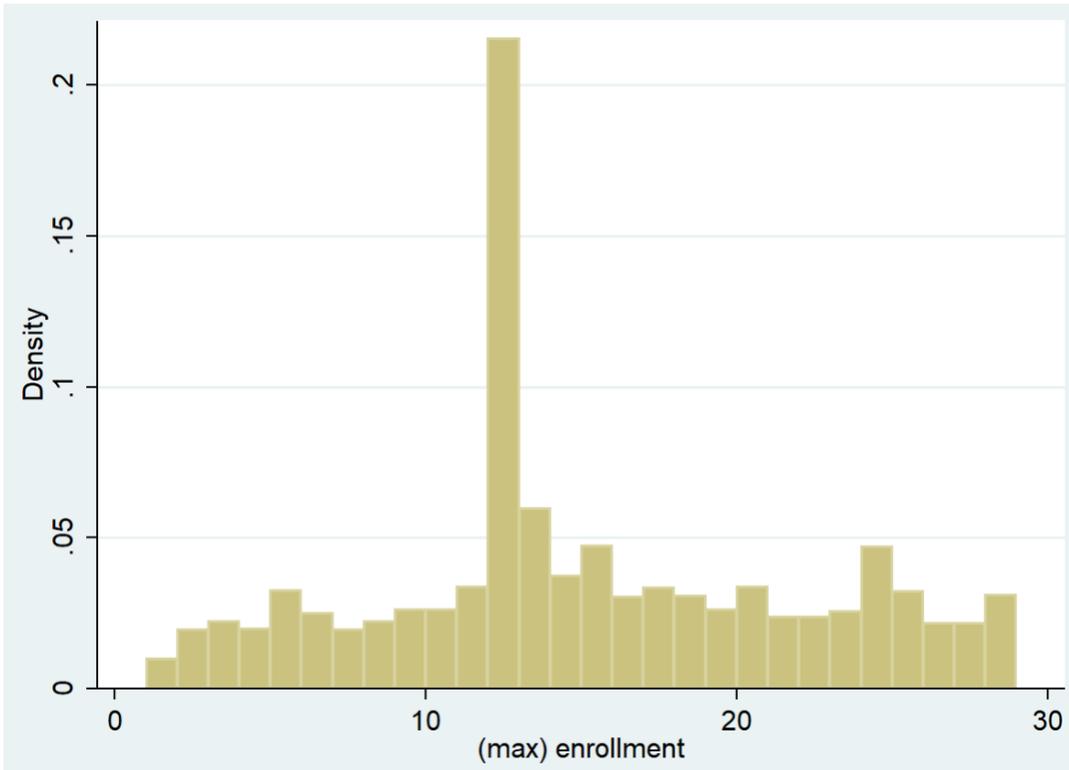
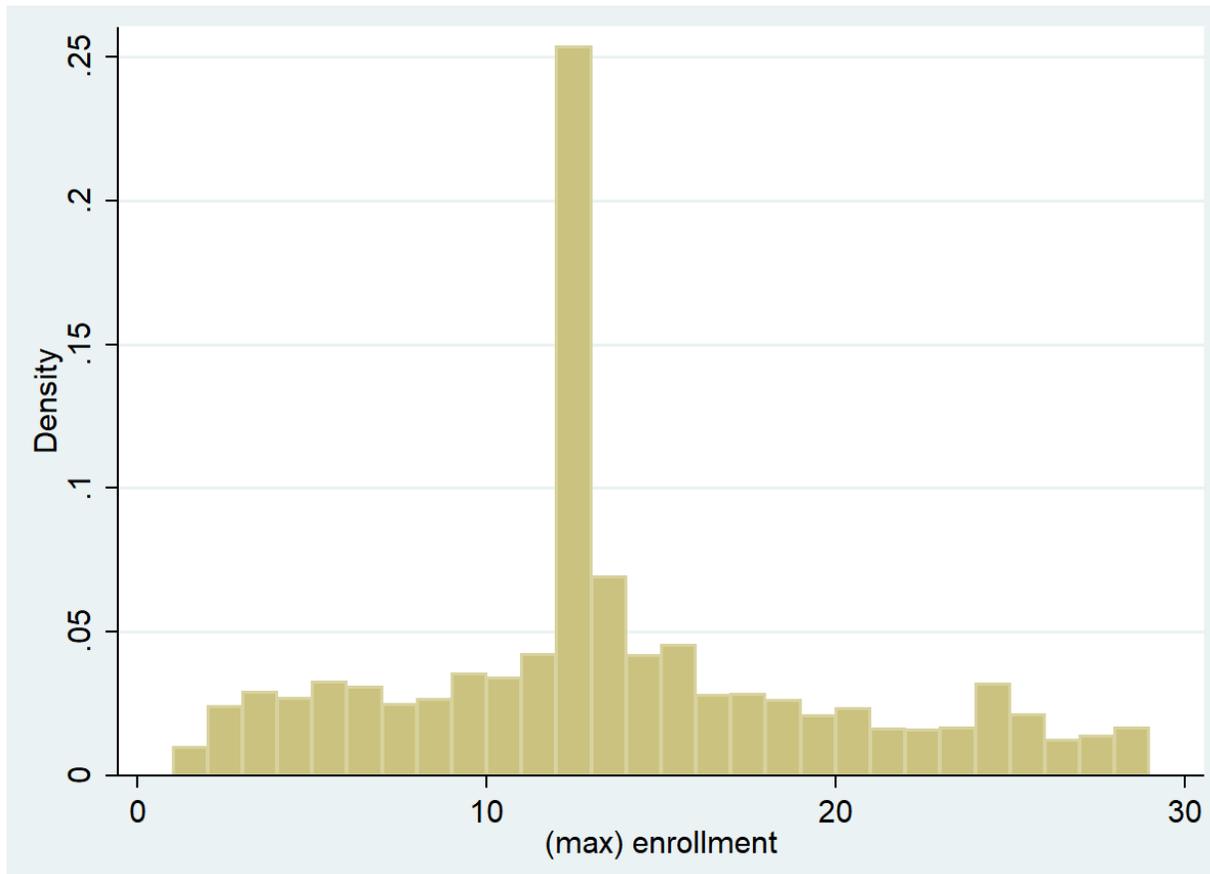


Figure 4.22 Overall density of number of months enrolled among disenrollers, FPL 100%+ and all Medicaid programs, sample of enrollees in HMP-MC or HMP-FFS >1 month



Hypothesis 4: Healthy Behavior Rewards and Healthy Behaviors

Table 5.1 Predictors of Healthy Behaviors, Predicted Prevalence Numbers Based on Probit Regression

	Lost weight in past 12 months (n=4,030)	<i>p-value on regression coefficient</i>	Among smokers, trying to quit smoking (n=1,513)	<i>p-value on regression coefficient</i>	Got flu shot this year (n= 4,030)	<i>p-value on regression coefficient</i>
Healthy behavior reward						
No	30.5%		79.9%		35.3%	
Yes	34.5%	0.047	87.8%	0.005	42.8%	< 0.001
Age						
19-34	31.6%		77.5%		34.0%	
35-50	33.7%	0.365	82.9%	0.117	37.5%	0.142
51-64	29.0%	0.240	86.7%	0.003	43.0%	< 0.001
Gender						
Male	29.4%		79.6%		36.5%	
Female	33.7%	0.023	85.2%	0.028	38.6%	0.297
Race						
White	30.1%		80.8%		37.0%	
Black	36.8%	0.011	87.2%	0.089	37.3%	0.904
Other	26.8%	0.354	76.4%	0.453	43.7%	0.075
Mixed	32.7%	0.589	80.6%	0.979	34.5%	0.615
FPL						
0-35 %	30.8%		82.5%		38.3%	
36-99 %	32.7%	0.345	83.6%	0.699	36.7%	0.473
100+ %	32.4%	0.465	78.0%	0.162	37.0%	0.596
Region						
UP/NW/NE	34.7%	0.489	81.8%	0.854	39.7%	0.493
W/E Central/E	29.7%	0.215	81.1%	0.685	36.1%	0.528
SW/S Central/SE	30.6%	0.418	82.8%	0.945	38.5%	0.771
Detroit Metro	32.7%		82.6%		37.7%	

*p-value on regression coefficient from probit regression coefficient

Table 5.2 Predicted Prevalence of Healthy Behavior Based on Healthy Behavior Reward and Demographic Characteristics from Probit Regressions of flags for Behavior

	Preventive visit	<i>p-value on regression coefficient</i>	Preventive screening	<i>p-value on regression coefficient</i>	Using copay exempt medication	<i>p-value on regression coefficient</i>
Time Period and Federal poverty level						
0-6 Months: No Reward	24.8%		44.3%		35.8%	
0-6 Months: Reward	15.4%	< 0.001	36.0%	< 0.001	37.8%	< 0.001
7-12 Months: No Reward	17.4%	< 0.001	37.3%	< 0.001	38.9%	< 0.001
7-12 Months: Reward	12.4%	< 0.001	29.0%	< 0.001	37.7%	0.238
13-18 Months: No Reward	10.9%	< 0.001	26.2%	< 0.001	38.8%	< 0.001
13-18 Months: Reward	54.7%	< 0.001	67.2%	< 0.001	47.2%	0.854
19-24 Months: No Reward	26.2%	< 0.001	47.6%	< 0.001	48.9%	< 0.001
19-24 Months: Reward	33.6%	< 0.001	53.1%	< 0.001	50.5%	0.113
25- 30 Months: No Reward	21.9%	< 0.001	41.1%	< 0.001	49.7%	< 0.001
25- 30 Months: Reward	19.2%	< 0.001	38.2%	< 0.001	50.8%	0.348
FPL						
0-35 %	21.5%		40.3%		42.7%	
36-99 %	22.0%	< 0.001	40.6%	0.023	39.1%	< 0.001
100+ %	21.6%	0.460	40.2%	0.692	38.6%	< 0.001
Age						
Under 30	20.3%		31.3%		16.4%	
30 to 39	20.8%	0.001	33.7%	< 0.001	28.4%	< 0.001
40 to 49	22.3%	< 0.001	42.5%	< 0.001	46.8%	< 0.001
Over 50	22.4%	< 0.001	47.5%	< 0.001	57.3%	< 0.001
Gender						
Male	16.7%		32.3%		39.6%	
Female	25.8%	< 0.001	47.1%	< 0.001	42.5%	< 0.001
Race						
White	22.3%		40.2%		41.0%	
Black	20.3%	< 0.001	40.4%	0.165	42.0%	< 0.001
American Indian	22.5%	0.778	41.6%	0.075	46.3%	< 0.001
Hispanic	20.0%	< 0.001	42.4%	< 0.001	40.5%	0.165
Asian/Pacific Islander	22.9%	0.411	42.4%	0.007	38.4%	0.001
Unknown	21.2%	< 0.001	40.1%	0.604	39.3%	< 0.001
Region						
Upper Peninsula	18.0%	< 0.001	35.1%	< 0.001	38.8%	< 0.001
Northwest	22.5%	< 0.001	37.3%	< 0.001	39.2%	< 0.001
Northeast	18.2%	< 0.001	37.7%	< 0.001	40.1%	0.001
West	19.8%	< 0.001	40.5%	< 0.001	43.0%	< 0.001
East Central	17.3%	< 0.001	37.2%	< 0.001	41.9%	0.001
East	20.6%	< 0.001	39.0%	< 0.001	39.7%	< 0.001
South Central	17.7%	< 0.001	38.6%	< 0.001	38.8%	< 0.001

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Southwest	19.3%	< 0.001	38.9%	< 0.001	43.2%	< 0.001
Southeast	19.7%	< 0.001	39.6%	< 0.001	41.7%	0.010
Detroit Metro	25.0%	< 0.001	42.6%	< 0.001	41.1%	< 0.001
Total observations (Enrollee/months)	681,697		681,697		681,697	

Table 5.3 Marginal Effects of Fixed Effect Regressions on Healthy Behaviors (Diff in Diff Framework)

	Preventive visit	<i>p-value on regression coefficient</i>	Preventive screening	<i>p-value on regression coefficient</i>	Using copay exempt medication	<i>p-value on regression coefficient</i>
Healthy behavior reward						
Year 1						
Year 2+	-8.21%	< 0.001	-3.53%	< 0.001	0.73%	< 0.001
Time period						
0-6 Months						
7-12 Months	-14.92%	< 0.001	-11.46%	< 0.001	1.87%	< 0.001
13-18 Months	-8.95%	< 0.001	-7.94%	< 0.001	2.93%	< 0.001
19-24 Months	-16.05%	< 0.001	-17.46%	< 0.001	1.59%	< 0.001
25-30 Months	-19.47%	< 0.001	-23.15%	< 0.001	1.00%	< 0.001
FPL						
0-35 %						
36-99 %	0.99%	0.222	2.29%	0.011	0.62%	0.309
100+ %	2.36%	0.006	3.27%	0.001	0.93%	0.132
Total enrollees	158,366		158,366		158,366	

Table measures likelihood of preventive visit. Rows (except for constant) are change in percent likelihood from baseline, measured by constant.

Figure 5.1 Predictive Margins of Percentage of Enrollees Who Engaged in a Preventive Visit by Period and Healthy Behavior Reward; Predicted Percentages, Probit Regression with Interactions on Period and Reward.

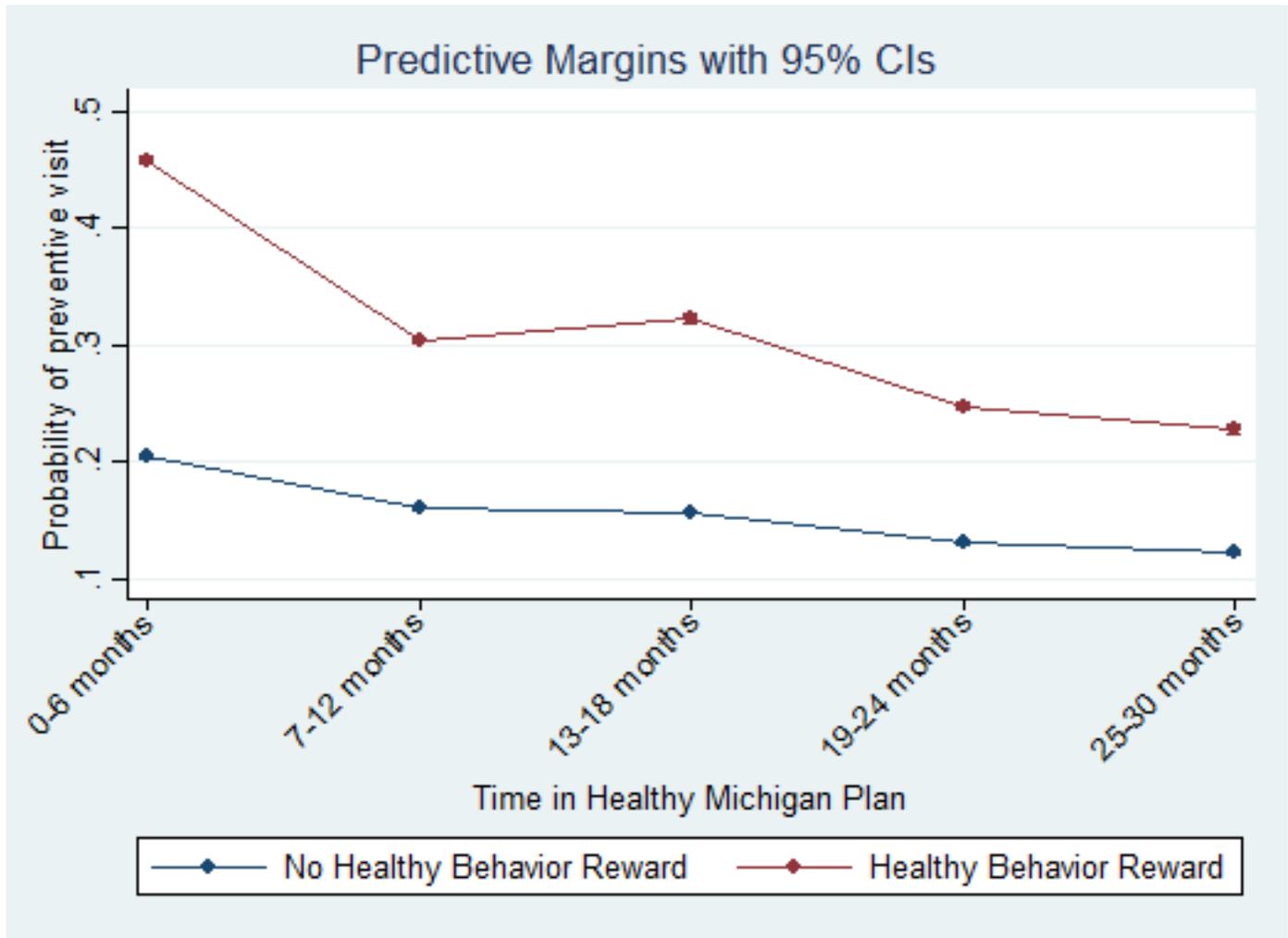


Figure 5.2 Predictive Margins of Percentage of Enrollees Who Engaged in a Preventive Screening by Period and Healthy Behavior Reward; Predicted Percentages, Probit Regression with Interactions on Period and Reward.

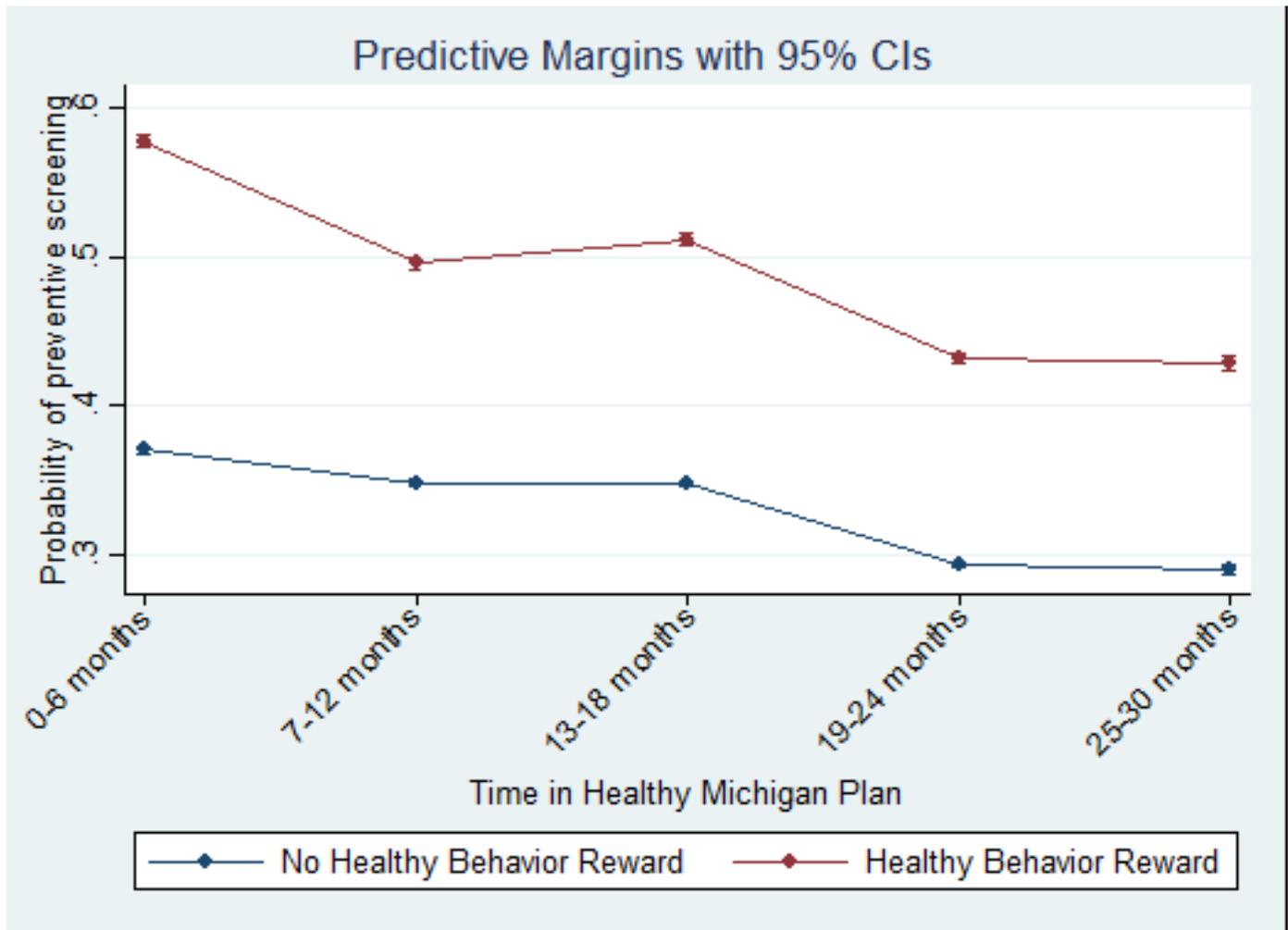


Figure 5.3 Predictive Margins of Percentage of Enrollees Who Use a High-Value Medication by Period and Healthy Behavior Reward; Predicted Percentages, Probit Regression with Interactions on Period and Reward.

