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Impacting Entry into Evidence-Based Supported Employment: A Population-Based Empirical Analysis of a Statewide Public Program

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ABSTRACT

Access to evidence-based supported employment (SE) services for persons with serious mental illness is limited in the U.S., despite evidence such services are effective and could benefit more persons. Major barriers to SE expansion are overlapping and limited funding streams, and interagency coordination problems. An important recent initiative in one state (Maryland) addressed both types of barriers. This longitudinal analysis of SE take-up probabilities for population-based cohorts of Medicaid recipients, during 2002-2010, provided tentative evidence of initiative impacts (particularly during the recession downturn), and evidence of effects for a schizophrenia diagnosis, prior work-history, health and demographic characteristics, and geographic accessibility.

Key Words: supported employment, state mental health, Medicaid

Introduction

Persons with serious and persistent mental illness (SMI) who express a desire to work far outnumber those who are employed (Bazelon Center 2014). Yet evidence-based supported employment (SE) for this population is clearly effective in promoting employment (Bond, 2004; Bond, Drake and Becker, 2008; Luciano et al., 2014). Accessibility to such SE services is, however, quite limited (Drake et al., 2009), and the take-up rate is low. For example, SAMHSA data show SE services have only been received by 1.7% of persons served by state mental health authorities (Bazelon Center, 2014). Bruns et al. (2016) present national data on these authorities indicating that the fraction of states offering any evidence-based SE services increased from one-half to three-quarters from 2001 to 2007, but that from 2007 to 2012 this fraction was stable or declining while the per state median number of persons receiving these services declined by about 20 percent.[1]

A major obstacle to expansion of SE services is inadequate sources of public or private funding and the resulting paucity of service providers offering the SE services (Mueser and Cook, 2016; Drake et al. 2016a). Recent and related policy reviews have cited the broader problems of implementing and funding evidence-based practices like SE as part of an integrated approach to treatment and rehabilitation services (Karakus et al. 2011; Drake et al., 2016b).

There have, however, been several major statewide initiatives to make SE services widely available to persons with SMI. The experience of these initiatives may provide important lessons for ongoing governmental efforts to increase the reach and impact of evidence-based SE programs.

This paper examines one of the earliest state initiatives, in Maryland, in impacting the reach of SE services provided through Maryland's public mental health system (PMHS) to the SMI population of

[1] Note that these figures provide a fairly complete national picture since other agencies such as vocational rehabilitation and private health insurers have a relatively limited involvement in SE services for persons with SMI.

the state. In particular, we focus on changes in the take-up rate of the SE services for PMHS clients during the period FY2002-FY2010. The analysis in this paper may also be of more general interest by providing the first population-based study of the factors that may influence take-up of supported employment (SE) by persons with SMI.

Background

Maryland, like many other states, has multiple agencies providing rehabilitative services to persons with SMI. In Maryland, the major involved agencies have been the Mental Hygiene Administration (MHA), within the Department of Health and Human Services, and the Division of Rehabilitation Services (DORS), within the Department of Education. In 1987, to ameliorate perceived coordination problems in funding and administration, these agencies developed an SE cooperative agreement (CA) for clarifying each agency's roles and responsibilities (Marrone et al. 2013). Ongoing efforts toward this end resulted in a revised CA in 1995 that specified SE eligibility requirements (based on the MHA "Priority Population" definition), and articulated the roles of the two agencies in client SE services provision and administrative processes (e.g., eligibility determination, referral, services planning for clients), and also projected SE funding levels and numbers of clients served. The 1995 CA documented the distinctions between DORS' provision of "time-limited" services and MHA's provision of "extended" services, and projected that MHA's annual funding and client levels for FY1995-FY1997 would be roughly 5 to 6 times that of DORS (MSDE-MSDHMH, 1995).

The MHA's role in Maryland's overall mental health services system changed markedly in 1997 with the implementation of a Section 1115 Medicaid waiver that created a single payor agency for all Medicaid and state general funds for mental health services, the Public Mental Health System (PMHS), as a new unit in MHA. Essentially, the state carved all publicly funded mental health services out from somatic and substance abuse services, under the auspices of the MHA, and with direct management by

the PMHS. While reorganization into a single statewide managed mental health program included SE services funded through MHA problems of coordination with SE services initiated and funded through DORS remained, relating to intake, referrals, and authorizations for services. In subsequent years, deliberations continued on integration of the DORS intake and PMHS managed mental health care authorization processes, on braiding of DORS and MHA funding streams for the PMHS consumers receiving DORS services, and on collaboration of DORS and PMHS staff in services planning and supervision. The result, by 2007, was substantial coordination, collaboration, and services integration between DORS and PMHS for the SMI clients served by PMHS (Marrone et al., 2013; MSDE-MSDHMH, 2007; Becker et al., 2007; Reeder and Johnson, 2008).

Two other aspects of Maryland's SE initiatives were important: (1) developing SE provider capacities to deliver SE services following the evidence-based individual placement and support (IPS) model, and (2) changes in funding practices. Initial provider capacity development activities focused on training, technical assistance and consultation, and began in FY02. As a follow-up, providers who received training and then worked to implement IPS were evaluated for fidelity to that model. Under MHA auspices, this evaluation process is continuing and includes annual re-evaluations for providers already certified as fidelity-compliant.

A major funding change was the decision (as of FY2001) to only allow PMHS payments for SE services in programs that focused exclusively on competitive job placement outcomes (MSDE-MSDHMH, 2000; Reeder and Johnson, 2008). [2] A second major funding change, effective in FY06, was the specification of psychiatric rehabilitation program (PRP) services for Medicaid enrollees who were in SE programs to permit Federally-matched funding for PRP services that met this specification. A

[2] This precluded PMHS SE payments for "traditional", non-evidence-based agency employment services (e.g., sheltered or set-aside work, enclave employment, or pre-employment skills training).

third funding change, introduced in FY07, was additional PMHS incentives for SE providers who were certified by MHA as having met the fidelity standards for evidence-based IPS-SE services.

Presumably these initiatives played a large role in expanding the reach and quality of SE services in Maryland. Descriptive data for the FY 2002-2010 period in fact show substantial growth in MHA's SE funding (166%), in numbers of local agencies providing services (nearly 39%), and the number of sites where SE services were provided (48.1%). This growth increased the geographic spread of SE services; the percentage (number) of counties with at least one SE provider site increased from 54.2% (n=13) to 70.8% (n=17).[3] As a result of the state's intensive provider-training efforts, by FY2010 nearly 60% of all SE providers were assessed as meeting fidelity standards. Numbers of consumers receiving SE services under PMHS auspices lagged provider growth by several years, but increased by 89.1% between FY2005 and FY2010.[4]

Study Objectives and Overall Design

A comprehensive assessment of the effectiveness of Maryland's SE initiative should consider a variety of relevant outcome measures, including impacts on the size and characteristics of the population served by SE programs, as well as impacts on the volume and effectiveness of the SE services provided. Our own research project has assembled a substantial data archive of individual-level administrative records for the fiscal years 2001 through 2010 to study these various outcome measures. These data include enrollment, claims, encounter, employment, and earnings records from Maryland and national sources. As part of that larger project, this initial analysis is concentrated on the factors potentially

[3] Maryland has 24 "county" jurisdictions, including the independent city of Baltimore.
[4] Further details and data sources are presented in Appendix Table 1. As shown in that table, the numbers of SE claims grew even more rapidly in this period, with claims doubling from FY2007 to FY2008 due to changes in administrative processes for provider billings to and payments by the PMHS.

affecting “entry” or “take-up”, which we define to mean the initial use of supported employment by individuals with SMI during our study period.

Our particular focus here is the relationship of the pattern of changes in entry probabilities over time to the timeline of MHA interventions that comprised the SE initiative. The practical challenges of rigorously measuring various effects of these interventions are, however, considerable. The administsrtive and practice changes in the SE initiative were implemented sequentially over time on a statewide basis. In the absence of relevant and comparable data on SE services and programs over the same time period in other states that might serve as a comparison group, this study was of necessity limited to Maryland data. This implies that specific causal interpretations drawn from the empirical results of the study are at best tentative. (We return to this point in the concluding sections of this paper.)

The empirical models presented here relate the probability of “take-up” to a detailed set of characteristics for individuals with SMI, and selected indicators of local SE provider accessibility and local labor market conditions. Since the overall population of Maryland individuals with SMI who are potentially eligible for PMHS-funded SE services changes over time, our analysis controls for these changes by focusing specifically on 3 large cohorts of persons covered by Medicaid. These large study cohorts include more than 2/3 of all persons who received SE services through PMHS in our cohort-selection years (FY2002-2004). Data on the characteristics of these persons and the services they received are substantial. In contrast, available and relevant information on supply-side behaviors of agencies that refer persons, authorize, or provide SE services was much more limited. This also applies to information on MHA personnel and contractors charged with regulating and overseeing SE provider agencies. (See the description of explanatory variables below.)

<u>Study Population</u>

We study 3 cohorts of Medicaid recipients. Cohort 1, based on FY2002 data, includes all 15,494 persons age 18 to 60, with at least 10 months of Medicaid enrollment, who had any Medicaid claims with a diagnosis included in the PMHS criteria defining the SMI population.[5] Cohort 2 included all 6,002 persons meeting the same criteria based on FY2003 data who were not already included in Cohort 1. Cohort 3 included all 5,511 persons meeting the same criteria based on FY2004 data who were not already included in either of the previous cohorts.

Data on persons in each cohort were collected over the period from FY2001 through FY2010. Data were excluded from the study for any years when a person had zero months of Medicaid enrollment (due to death or to having transitioned off of the Medicaid rolls. The principal sources for individual-level data were Maryland Medcaid records (encounter, enrollment, and claims), PMHS records (claims), and employment and earnings records from the Maryland Dept. of Labor, Licensing and Regulation (DLLR).

Information relating to rates of attrition and rates of engagement with the PMHS SE services are shown in Table 1. In all 3 cohorts, comparing baseline year and FY2010 data shows a fairly low overall rate of attrition, given the length of our follow-up period. By the end of FY2010, 73.3% of Cohort 1 (n=11,352) still reported at least 1 month of Medicaid enrollment and 68.1% reported 10+ months of Medicaid. For Cohort 2, 66.9 % (n=4,017) reported at least 1 month of Medicaid enrollment in FY2010 and 59.7% reported 10+ months of Medicaid. Similarly, for Cohort 3, 68.2% (n=3,757) reported at least 1 month of Medicaid enrollment in FY 2010 and 60.5% reported 10+ months of Medicaid. (All percentages are relative to the baseline-year cohort size.) Given the longer follow-up for the 2002 cohort, however, their yearly attrrition rate is clearly below that for the 2003 and 2004 cohorts.

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[5] Included ICD diagnoses were: 295.10 thru 295.95, 296.33, 296.34, 297.1, 298.9x, 301.22, 301.83, 296.43, 296.44, 296.53, 296.54. 296.63, 296.64, 296.80, and 296.89. (Labels for these diagnoses are provided in the Appendix .)

Cohort-specific rates of engagement with PMHS SE services show an irregular tendency to increase over time. As noted above, for both FY2003 and FY 2004, the total numbers of persons across our 3 cohorts receiving SE services accounted for over 2/3 of total persons (shown in Appendix Table 1) receiving such services in each year. While our cohorts' share of all SE services falls in later years (due to attrition in our cohorts and persons in later cohorts receiving services), the data indicate that we are capturing a relatively large share of all SE services provided by the PMHS.[6]

Analysis Design, Regression Samples, and Dependent Variable

The experience of each person in our data is divided into a pre-baseline year, a baseline year, and follow-up years. The baseline year corresponds to the year in which the cohort was selected: FY2002 for Cohort 1, FY2003 for Cohort 2 and FY2004 for Cohort 3. Follow-up years are each of the post-baseline fiscal years up through FY 2010. The pre-baseline year is the year preceding the baseline year. This structure was employed in a discrete-time survival analysis with the baseline as the initial year.

Inclusion criteria for our regression were: (1) no reported SE services in the pre-baseline year, (2) residence in the state of Maryland (in either the baseline year or at least one follow-up year), (3) and location information sufficient to allow computation of distance to the nearest SE provider (in the baseline or at least one follow-up year). Applying these criteria resulted in inclusion of 15,100 persons for Cohort 1 (FY02), 5,879 persons for Cohort 2 (FY03), and 5,247 persons for Cohort 3 (FY04). Since we study initial SE take-up, observations for year after an initial take-up were dropped from our regression sample. This resulted in a regression sample of 105,880 observations on Cohort 1 (i.e., a

[6] Other SE recipients are persons with Medicaid coverage from other cohorts (not in our study), as well as other persons whose SE services are funded by the State under block grant or "grey zone" provisions (i.e., funds for low-income persons who have no other funding for SE services). A very small amount of additional funding for SE services is provided by Maryland DORS.

mean of 7.0 per person). The corresponding figures for the later cohorts were as follows: 35,378 observations (6.0 per person) for Cohort 2; and 28,944 observations (5.4 per person) for Cohort 3.[7]

The binary dependent variable in our analysis was coded as 1 if PMHS claims data showed any receipt of a supported employment service in a fiscal year, and 0 otherwise. Supported employment services were defined as any of the following procedure codes in the corresponding PMHS claim:

s9445 – Psychosocial Rehabilitation Program (PRP) services to individuals in Supported Employment (if agency is PRP approved)
s9445-52 - Clinical Coordination, non-direct service
h2016u1 - Comprehensive Community Support Services, Per Diem.
h2018u1 - Psychosocial Rehabilitation Services, Per Diem.
h2023 - Intensive job coaching
h2024-21 - Job Placement
h2024 - Pre-placement
h2026-21 - PRP to Individuals in Supported Employment – Extended Support Services
h2026 - Extended Support Services[8].

For all observations included in our regression analyses, Table 2 shows the percentage of persons in each cohort for each year (beginning with FY2002) obtaining their take-up SE service in that year and the number of persons included in the cohort analysis sample for that year.[9] The three cohorts show similar time patterns beginning with the baseline years. The take-up in the baseline year is somewhat higher than in the following year, with further declines for the next several years; followed by increases through FY2007, and modest declines in later years. A general pattern of declines through our study

[7] The most common reason for exclusion in the baseline year was receipt of SE services in the pre-baseline year; this was true for 381 persons in the 2002 cohort, 101 persons in the 2003 cohort, and 94 persons in the 2004 cohort.

[8] For PMHS claims in FY 2001 through FY 2004, the coding scheme for SE services included several older codes that were recoded in our analysis as follows: W9530, W9531 and W9532 recoded to h2024; W9533 recoded to h2024-21; W9534 recoded to h2023; and W9535 recoded to h2026. The definitions of these codes were: W9530 thru W9532 – pre-employment phase services; W9533 – job placement; W9534 – intensive job coaching; and W9535 – extended support services.

[9] Of all services we identified in claims as the first SE service in the take-up year, 82.3 percent were coded as h2024 (pre-placement). This is consistent with our defining the first SE service following a full year with no SE services as the start of a new SE services episode.

period is expected purely on the basis of declining hazard rates for individuals, though Maryland's initiatives may have interrupted this tendency.[10] Another possible explanation for higher take-up rates in the baseline year or first year after baseline is that persons in these years had previously received some SE services in years prior to FY 2001 (the first year of our data collection).[11] We explore these possibilities in our regression analyses. In general, however, overall take-up rates are low, averaging less than 2% per year. Finally, while the time patterns with reference to the baseline years across the 3 cohorts are similar, the rates for the FY02 cohort tend to be higher. This differential may be a result of differences in characteristics of the cohorts (as discussed below).

Explanatory Variables

Brief definitions of our explanatory variables are provided in Table 3. (More detailed information on data sources and variable definitions are in the Appendix.) We include a number of explanatory variables describing characteristics of persons with SMI presumably related to their potential demand for SE services. While there are no prior population-based studies of SE take-up for these persons, our choices of such explanatory variables drew heavily on findings about determinants of participation in recent Social Security Administration work-related experiments for SSI recipients (Ruiz et al., 2006) or SSDI beneficiaries (Frey et al., 2011; Salkever et al., 2014a) with psychiatric disabilities. Following these studies, we included pre-baseline measures pertaining to demographics, diagnosis, prior work history, and health/mental health services use.[12] We also included the demographic characteristics of age, gender, and race/ethnicity; the principal rationale for use of these measures in prior studies was that factors associated with a reduced probability of employment in the general population tend to

[10] Declining hazard rates could result from selection factors (i.e., persons most likely to take up SE do so more rapidly), or from observable time-varying factors (e.g., increasing age).
[11] This is consistent with the fact that the SE engagement rates in Table 1 were much larger than in Table 2.
[12] The construction of the diagnostic groupings used in our regressions is described in the Appendix.

reduce the potential economic gains from individuals' participation in supported employment programs (Salkever et al., 2014a and 2014b). This would argue for expecting demographic factors such as female gender, age, or minority status to have negative impacts on SE take-up rates.

The same perspective suggests that individuals with poorer health status (as indicated by higher baseline use of somatic or mental health services) will have lower market productivity and lower prospects of successful employment outcomes from SE services, while indicators of greater prior work experience (specifically pre-baseline earnings and Medicare coverage) should have positive impacts on take-up.[13] Prior research has also suggested that diagnostic differences are relevant, with reported evidence of more positive vocational outcomes for persons with affective disorders compared with persons with schizophrenia (Razano, 2005; Salkever et al., 2014b; Wewiorski and Fabian, 2004).[14]

Several other explanatory variables are also potentially relevant for demand-side reasons. We include geographic distance from the individual's residence to the nearest SE provider on the presumption that it implies higher non-monetary costs of SE services to individuals and therefore may impact negatively on take-up rates. The average monthly unemployment rate over the fiscal year for the individual's county of residence is included as a summary measure of local economic conditions. The presumption is that positive local market conditions, as indicated by lower unemployment rates, would encourage SE participation. A logarithmic time trend was included to capture the expected downward trend in the baseline hazard rate, due to selection effects, for the years following each individual's

[13] We view Medicare coverage in the cohort year as a proxy for being an SSDI recipient since (1) none of the persons in our study were older than 60 in the cohort year and (2) the principal way these persons qualified for Medicare was by virtue of being on SSDI. Persons receiving SSDI benefits had to qualify for eligibility based on a record of previous work.

[14] It is interesting to note, however, that prior literature evaluating SE programs (e.g., Kinoshita et al., 2013) suggests provider experience has primarily focused on persons with schizophrenia-related diagnoses.

baseline year. (The logarithmic form allows the effect of each additional year on the hazard rate to decline over time.)

Three sets of additional dummy variables were included to capture unmeasured cohort-specific differences, unmeasured geographic region differences, and statewide variations over time in factors influencing take-up rates for all individuals across all cohorts and regions. Two cohort-specific intercepts were used to account for unobserved average differences in personal characteristics across the three cohorts. Region effects are captured by a series of six dummies based on individuals' regions of residence within the state. Dummies for each fiscal year are included to capture statewide variations over time in the implementation of the MHA's SE initiative as well as other unmeasured statewide factors such as state budgetary or health policy initiatives or changes in economic conditions impacting the mental health sector.

We also note possible complications in the interpretations of the variables suggested above. Our suggestions about the demand side relevance of many of our explanatory variables need to be qualified by the recognition of possible supply side influences. For example, the workings of the referral and authorization processes may exercise important influences on the probability of a particular individual accessing SE services. These processes could be affected by a variety of factors beyond the control or awareness of individual clients, such as service backlogs due to staffing issues facing the relevant MHA or DORS offices or service providers. Similarly, limitations on SE agencies' capacities, or challenges in developing sufficient numbers of competitive community-based job opportunities with private or public-sector employers could have impacted the availability of SE slots in the provider agencies; while this availability probably varied across regions and over time, direct availability measures are not observable.

Mean values of explanatory variables across cohorts (in Table 3) are generally similar but there are some clear differences. While most demographic characteristics and residence locations show little difference across cohorts, persons in the FY2002 cohort are older; their mean baseline age exceeds the mean baseline ages for the FY2003 and FY2004 cohorts by more than two and one-half years. Differences in prior work history variables are also noteworthy, with the FY2002 cohort showing lower prior year mean earnings but also a higher rate of Medicare coverage (which we view as a proxy for SSDI receipt). Differences in pre-baseline services use and diagnoses are also potentially important. The FY2002 cohort shows a much higher prevalence of schizophrenia as their major diagnosis, as well as higher prior use of inpatient mental health treatment days and lower prior use of substance use or somatic inpatient treatment days. These inter-cohort differences in average characteristics in the cohorts argue for our inclusion of cohort-specific intercepts in our regression models based on the entire data set pooled across the cohorts.

Regression Methods

We estimated regression models using pooled data combined across all 3 cohorts. This allowed for models that included both an individual-level time pattern of hazard rates, as well as year-specific intercepts that captured state-level variations in take-up over time (possibly resulting from the phased implementation of the Maryland initiative as well as variations in economic conditions). We also compared and corroborated the results of these pooled data regressions with those from cohort-specific analyses (detailed in the Appendix).

All regressions used the complementary log-log functional form, which is the discrete-time analog of the standard proportional hazards model (Jenkins, 1995 and 2005). In this model, the interval hazard rate for the jth interval, h_j, is given by the equation

$$h(j,X) = 1 - \exp[-\exp(b'X + g_j)],$$

where *b* is a vector of coefficients, X is the vector of explanatory variables, the expression "exp[z]" means "e raised to the power z", and the interval-specific g's summarize the pattern of duration dependence.

Regression coefficients and standard errors were estimated with a pseudo-maximum-likelihood procedure in Stata, allowing for clustering effects of unobserved disturbances for the same individual over time. (Alternative estimates from a Gaussian random-effects specification were also obtained, yielding virtually identical results. See the Appendix for further details.) We then estimated average marginal effects for each of our explanatory variables using the Stata "margins, dy/dx" command.[15]

Results

Estimates for regression coefficients and marginal effects are reported in Tables 4 and 5 respectively. We report results for 2 different specifications of the statewide time trend indicators; Regression 1 shows results when individual fiscal-year dummies are included while Regression 2 shows results when these dummies are replaced by linear and quadratic values for the time trend (with the trend set = 1 for fiscal 2002). For all other variables, results are very similar in both specifications.

Since the signs and p-values of the coefficient and marginal effect estimates for the same explanatory variable are always the same, while the interpretation of the coefficients in non-linear models such as the clog-log are difficult, we focus our discussion on the marginal effect estimates in Table 5 which can be interpreted as the ceteris paribus effect on the probability of take-up of a 1-unit change in the relevant explanatory variable. For example, the estimated marginal effect of a 1-unit increase in ERN_Lag1 means that ceteris paribus, a person with $1,000 more in pre-baseline-year

[15] Marginal effects for all binary and categorical variables were estimated as discrete changes (from 0 to 1 for all binary variables and as changes from the reference category for other categorical variables). Also note that these estimates are the overall means of the estimated effect averaged across all 170, 202 data points in our regressions.

earnings has a take-up probability in any year that is 0.0003061 higher than an otherwise identical person. In the case of binary 0-1 variables, the relevant change for measuring the marginal effect is from 0 to 1. Thus, a person with 1+ Medicare months coverage in the baseline year has a take-up probability in any year that is 0.0036 higher than an otherwise identical person with 0 months of Medicare coverage. While these numbers seem very small, it is important to remember that the overall average 1-year take-up probability in our data is only 0.0152. Thus the estimated marginal effect of Medicare coverage implies an increase for the average person of about 20% in their take-up probability.

In view of the very large number of observations in our regressions, the fact that many of the estimated marginal effects in Table 5 are highly significant is to be expected. The signs and magnitudes of these highly significant effects are, however, of considerable interest. The significant effects for the prior work history variables are positive as expected, and we have already noted that the magnitude of the MCARE_FLAG effect is fairly large relative to the overall average take-up rate. The much smaller estimated average marginal effect for ERN_Lag1 may not be surprising, however, since only 30.3% of observations in the regression had positive pre-baseline-year earnings.

For the demographic variables, age and gender both had highly significant and negative estimated marginal effects, which is consistent with the general expectation that persons with lower expected earnings in the labor market will be less likely to take-up SE services. We also note that negative marginal effect for females is large relative to the mean take-up rate, but observe that the smaller marginal effect for AGE pertains only to 1-year changes. Thus, the implied effect of, say, a 10-year differential in age (e.g., 30-year old person vs. a 40-year old person) is a difference in take-up probability similar to our estimated average marginal effect for females vs. males. The other interesting result for demographic factors is that coefficient and marginal effects for the racial categories were not significant (either individually or jointly, with a joint p-value of 0.456).

Results for the pre-baseline health variables generally indicated negative marginal effects of prior health care use, specifically for long-term care and inpatient somatic care. The marginal effect of one additional somatic day is small but the implied effect of an additional stay is roughly -0.005 for stays of 10 days (the mean number of days for the observations with prior somatic days greater than zero in our data). The significantly positive coefficient on prior inpatient mental health use was not expected.

Estimated marginal effects for the categorical primary baseline diagnosis dummies were uniformly significant, negative and large. These estimates indicate that relative to persons with schizophrenia, persons with all other primary diagnoses have substantially lower take-up probabilities. The largest estimates, for major depressive disorders (-0.0104) and for delusional psychoses and other psychotic disorders (-0.0118), are more than 2/3 the magnitude of the overall take-up rate. In view of the prior research indicator poorer labor market outcomes for persons with schizophrenia, these results are surprising and invite consideration of "supply side" factors for interpreting our empirical findings.

As expected, we found driving distance in miles to the closest SE provider (SEPROVDIST) have a significant but fairly small negative effect on SE take-up probability. Our indicator of local labor market conditions (CNTY_UN_RATE) also was estimated to have a significant negative take-up effect. The size of this estimate (-0.0037) indicates that a 1% increase in county unemployment translates into about a 25% decline in take-up probability from the overall average rate. Implications of changes in the values of SEPROVDIST and CNTY_UN_RATE over our study period for understanding observed changes over this period in take-up rates are considered below.

Estimated marginal effects for both cohort dummies are negative and relatively large. While our regression model controls for inter-cohort differences in a number of characteristics that appear to be important determinants of take-up rate (e.g., age, primary diagnosis category, prior work history), the cohort dummy results imply there are other significant inter-cohort

differences due to unmeasured variables. We speculate on the possibilities for omitted variables below.

Results for LnTime conform to our expected finding of a declining hazard (i.e., take-up) rate over time for the same individuals. This is apart from the negative effect of aging on these individuals since AGE is also one of our covariates. The implied year-to-year change in the take-up rate shrinks from about -0.007 from baseline to the first follow-up year to about -0.001 from follow-up year 8 to follow-up year 9.

Estimated marginal effects for the fiscal year dummies are of particular interest since they capture the unmeasured year-to-year variations in statewide factors, including consequences of policy shifts under the SE initiative, not directly measured by our included variables. The pattern of time variation in these results is of particular interest. We find a relatively small negative estimate for FY2003 (compared with FY2002) of about -0.0016 that shrinks over time to -0.00016 for FY2006 (compared to FY2002), and changes to positive and increases steadily from +0.0053 in FY2007 to +0.0314 in FY2010. While this upward trend is consistent across all years, the individual year dummies are not significant until FY2009 and FY2010. Since a joint test of all fiscal year dummies together yielded a highly significant $\chi^2(8) = 121.4$, we replaced the 8 dummy variables with a linear time trend (=1 for FY2002 and 9 for FY2010) and its square. Results, shown in Regression 2 in Table 5, indicated a not-quite significant annual marginal increase of 0.13%. The corresponding coefficient results in Table 4 indicated a small positive time effect beginning in FY2004 that increased over time through to FY2010. As discussed below, this pattern of changes in statewide effects over time invites comparison with the similar arc over time in the implementation of Maryland SE initiative.

Finally, note that the results for the region of residence dummies (reported in the Appendix) only indicated significant and positive differences (relative to the Baltimore region reference category) for three less heavily urbanized areas: Western Maryland, the Upper Eastern Shore, and the Middle Eastern Shore. (Results of estimating additional regression models to test the sensitivity of the findings reported here are briefly discussed below and reported in full in the Appendix.)

In addition to the results just described, additional regression models were estimated as sensitivity tests for our results. We estimated several variants of our pooled regression model, including models with an alternative form for the individual time-trend variable, models with Gaussian frailty terms (i.e., individual-level random effects), and cohort-specific models that did not include fiscal year dummies.[16] The results from all of these additional regressions are reported in the Appendix and indicated no substantial differences from the major findings presented here.

Discussion

Several of our empirical results are of interest in terms of providing directions for future analyses of Maryland's SE program. First, it is interesting to note that personal characteristics (e.g., gender, age, pre-baseline earnings history variables, diagnosis, and pre-baseline long-term care use and somatic hospitalizations) appear to have strong influences on an individual's probability of SE take-up. In contrast, it is often noted in the literature that SE services are beneficial for a very wide variety of consumers (Campbell et al. 2011), and one of the important IPS fidelity criteria is that providers should meet a "zero-exclusion" admissions process for SE (Becker et al., 2001). Thus, it may be important to

[16] In cohort-specific regressions, statewide effects could not be identified separately from individual-level time effects since all persons in the same cohort had the same base year.

determine the extent to which the influence of personal characteristics on take-up reported here is accounted for by consumer choice or by "supply side" factors such as the authorization and referral processes for PMHS clients, referral practices of mental health services providers, and/or the willingness of SE providers to accept new clients. In particular, further detailed analyses of disparities in take-up rates by diagnosis appear to be warranted in light of our findings that persons with diagnoses other than schizophrenia had substantially lower take-up rates.

Second, it is interesting to consider the role of two other significant time-varying factors in relation to the take-up rate trends for our cohorts shown in Table 2. While distance to the closest SE provider (SEPROVDIST) might have been expected to decline in response to the MHA's efforts to develop ore provider resources, our data show only a very modest decline over our study period; from FY2002 to FY2010, the mean for SEPROVDIST declined from 4.52 to 4.38 miles while the median declined from 2.81 to 2.77 miles.[17]

In contrast, the increase in the unemployment rate over time was substantial due to the economic downturn in FY2009. The mean rate for our cohorts rose from 5.33% in FY2002 to 8.88% in FY2010, with all of that increase occurring from FY2008 (when it had fallen to 4.28%) to FY2010. Based on our marginal effect estimates for CNTYUNRATE, this increase implies a negative effect of almost one full percentage point in the take-up rate. It also seems possible that the large marginal effect for CNTYUNRATE was not due only to an increase in the unemployment rate, but also to other correlated economic trends in Maryland. For example the economic downturn may also have had negative effects

[17] The mean distance across all persons in our cohorts (and all years) fell from 5.00 miles to 4.52 miles with all the decline occurring after FY 2005. This may be a better indication of the increase in SE provider accessibility since it was not affected by selection due to deletion of post-take-up years from each person's data.

on funding for public mental health services generally that resulted in fewer persons being referred for SE services.

Third, it is noteworthy that while economic conditions as proxied by CNTYUNRATYE improved modestly from FY2004 to FY2008 and then deteriorated dramatically, our fiscal year dummy estimates for other unmeasured statewide factors continued strongly upward from FY2004 through the remainder of our study period. A speculation on one possible reason for this time pattern is that the most potent components of the SE initiative, relating to provider development, and especially to the funding change in FY2006 that brought in Federal matching dollars for Medicaid, were implemented in the years from FY2005 on. (The Federal matching for PRP services to Medicaid enrollees in SE programs began in FY2006 and rose to approximately 1/6 of total funding for SE-related services statewide by FY2010.) One might expect SE provider agencies to respond to this change in funding by expanding their capacity to provide services and thereby increase the numbers of SE clients they could serve. According to this view, capacity constraints of providers are an important factor in determining take-up rates; unfortunately, capacity proxies (such as staffing levels) are not routinely collected by MHA and therefore could not be incorporated directly into our regression model.

Limitations and Directions for Future Research

While the limitations of our study to the fiscal 2002, 2003 and 2004 cohorts is important for measuring and statistically controlling "demand side" influences on take-up, it also necessarily implied that much of our data be drawn from the period up to fiscal 2005 when the growth of the SE program was still very modest. Examination of similar experiences of later cohorts would be an important contribution.

Our analysis was mainly restricted to administrative data from Medicaid and PMHS, and comparably detailed information from other agencies providing or funding services to our study cohorts

(such as DORS or Medicare) was not available. This limited our ability to explore pre-Medicaid experiences of our cohorts and to examine the pathways into Medicaid recipiency that may have affected the take-up of SE services or other Medicaid-financed PMHS services.

We also recognize that much additional information about individual clients' circumstances and reasons for seeking or not seeking SE services could be obtained from individual interviews that would greatly enhance our understanding the results presented here. This also applies to surveys or other detailed investigations of practices and process of agencies providing services and entities responsible for authorizing and monitoring PMHS services. For example, more detailed study of provider agency processes could help in understanding the surprising differences across diagnostic categories in take-up probabilities observed in our data.

Moreover, as noted earlier, the lack of more detailed information and data on the clients, providers, regulators and funders of SE services in Maryland complicates interpretation of important results of the study. An example is our results about impacts of labor market and economic conditions. Negative unemployment effects on take-up could have resulted from persons with SMI seeing diminished job prospects and therefore not seeking SE services, or from challenges provider agencies faced in finding possible job opportunities with employers, or changes by relevant public agencies in the rate at which new SE clients were authorized.

Finally, we also noted earlier that a research design with one or more comparison groups, such as Medicaid enrollees in other states, would have provided the opportunity to apply standard methods for measuring causal impacts of new policies (such as use of a difference-in-differences research design). Lacking such comparative data, our conclusions about causal impacts on take-up rates of Maryland's SE initiative are much more tentative.

Summary and Conclusions

The FY2002-FY 2010 period witnessed a substantial growth in service volume, funding, and persons served in Maryland's publicly supported and managed supported employment (SE) program, with the bulk of that growth occurring after FY2005. This period also coincided with the implementation of the Maryland SE initiative, which was a series of SE policy and resource development efforts undertaken by the state.

As part of an effort to examine the consequences of this initiative, this paper used a population-based cohort approach to examine factors that influence take-up rates for persons covered by Medicaid who had not used SE services for at least 12 months preceding the period of our analysis. The analysis was structured as a discrete-time hazard model with the 0-1 outcome of SE take-up, and explanatory variables that included baseline characteristics of cohort persons as well s selected time-varying factors.

Our analysis results suggested that personal characteristics indicative of stronger prior job history or better labor market prospects were significant predictors of SE take-up; these included gender, age, prior work history, and absence of pre-baseline use of inpatient somatic care. Contrary to expectations, we also found that relative to other SMI diagnosis groupings, the probability of take-up was significantly higher for persons with schizophrenia.

Two time-varying factors were also significant but could not account for the growth in the SE program during our study period. Geographic access (distance) from SE providers had a negative estimated marginal effect on take-up probability, but the magnitude was small and we observed only small decreases in this access barrier over time in our data. We estimated a relatively large and negative marginal effect for the county unemployment rate, but during the latter part of our study period this measure increased (with the national recession), the very period when Maryland's SE program was expanding.

Finally, a series of fiscal-year dummies were included to capture the influence of changes over time in statewide factors that were not directly measured, presumably including changing state and national economic conditions, state and Federal health policy and funding decisions, and the year-to-year implementation in the state of the SE initiative. Estimated marginal effects for these dummies showed a weak evidence of a negative trend in impacts on SE take-up through FY2004 but much stronger evidence of a positive trend beginning in FY2007 and continuing through the recession years of FY2009 and FY2010. Since the latter period also witnessed the implementation by the MHA of key components of the SE initiative (especially pertaining to funding), we view these results as providing at least suggestive evidence of important impacts of the SE initiative (that also counteracted the negative effects of the recession).

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Table 1: Cohort N's and % of Individuals Who Received at Least One SE Service in the Current Fiscal Year

Fiscal Yr.	2002 Cohort			2003 Cohort			2004 Cohort			All Cohorts Combined		
	N*	Any SE		N*	Any SE	Any SE	N*	Any SE	Any SE	N*	Any SE	Any SE
		Count	%		Count	%		Count	%		Count	%
2001	*14642*	*381*	*2.60%*	*3728*	*39*	*1.05%*	*2993*	*36*	*1.20%*	*21363*	*456*	*2.13%*
2002	**15494**	**815**	**5.26%**	*5054*	*101*	*2.00%*	*3327*	*47*	*1.41%*	23875	963	4.03%
2003	**15059**	**735**	**4.88%**	**6002**	**163**	**2.72%**	*4662*	*94*	*2.02%*	25723	992	3.86%
2004	**13989**	**670**	**4.79%**	**5704**	**186**	**3.26%**	**5,511**	**154**	**2.79%**	25204	1010	4.01%
2005	**13290**	**639**	**4.81%**	**4969**	**147**	**2.96%**	**5,204**	**155**	**2.98%**	23463	941	4.01%
2006	**12764**	**597**	**4.68%**	**4586**	**147**	**3.21%**	**4,436**	**130**	**2.93%**	21786	874	4.01%
2007	**12332**	**687**	**5.57%**	**4422**	**144**	**3.26%**	**4,170**	**142**	**3.41%**	20924	973	4.65%
2008	**11870**	**728**	**6.13%**	**4177**	**157**	**3.76%**	**3,927**	**147**	**3.74%**	19974	1032	5.17%
2009	**11577**	**685**	**5.92%**	**4071**	**153**	**3.76%**	**3,846**	**146**	**3.80%**	19494	984	5.05%
2010	**11352**	**653**	**5.75%**	**4017**	**140**	**3.49%**	**3,757**	**131**	**3.49%**	19126	924	4.83%

* Initial and continuing cohort adjusted for Medicaid-reported mortality/study attrition. Person-years with Medicaid months = 0 are excluded from N. Data in bold are for cohort or post-cohort years.

TABLE 2: REGRESSION SAMPLE SIZES AND SUPPORTED EMPLOYMENT TAKE-UP RATES FOR OBSERVATIONS IN DISCRETE-TIME SURVIVAL REGRESSIONS								
	Cohort 1		Cohort 2		Cohort 3		All Cohorts	
FY	N	% Take-Up	N	% Take-Up	N	% Take-Up	N	% Take-Up
2002	15,087	3.50%					15,087	3.47%
2003	14,139	2.00%	5,872	1.90%			20,011	1.93%
2004	12,839	1.40%	5,468	1.70%	5,377	1.80%	23,684	1.55%
2005	12,019	1.30%	4,666	0.90%	4,983	1.60%	21,668	1.30%
2006	11,385	1.20%	4,265	1.10%	4,182	0.80%	19,832	1.10%
2007	10,855	1.60%	4,069	1.20%	3,892	1.00%	18,816	1.40%
2008	10,229	1.60%	3,796	1.00%	3,615	1.00%	17,640	1.34%
2009	9,815	1.10%	3,659	0.90%	3,508	1.00%	16,982	1.02%
2010	9,512	1.00%	3,583	0.60%	3,387	0.70%	16,482	0.86%
Total	105,880	1.72%	35,378	1.22%	28,944	1.16%	170,202	1.52%

Table 3: Definitions and Mean Values for Explanatory Variables (All Years)*					
Variable Name	**Definition**	Cohort 1 (FY02)	Cohort 2 (FY03)	Cohort 3 (FY04)	All Cohorts
FIXED VARIABLES (baseline or pre-baseline year)		N=105,880	N=35,378	N=28,944	N=170,202
Prior Work History					
ERN_Lag1	Earnings ($ 000's), 1 yr. pre-cohort **	1.013	1.711	1.658	1.267
MCARE_FLAG	=1 if any Medicare coverage in cohort year; = 0 otherwise	0.341	0.233	0.222	0.302
Demographics					
Female	=1 if gender is female; = 0 otherwise	0.549	0.594	0.6	0.579
Black	=1 if race = black; = 0 otherwise	0.487	0.499	0.473	0.497
Hispanic	=1 if person is Hispanic; = 0 otherwise	0.011	0.008	0.013	0.01
OtherNW	=1 if race = other non-white; = 0 otherwise	0.035	0.037	0.038	0.035
	(Race reference group is white.)	0.467	0.456	0.476	0.458
Main Diagnosis in Pre-Baseline Year					
MAJDEP	Major depression	0.207	0.348	0.381	0.265
BPDIS	Bipolar disorder	0.171	0.254	0.23	0.191
DELPSYCH	Delusional psychoses	0.09	0.109	0.112	0.1
SBPD	Schizotypal or borderline personality disorder	0.007	0.007	0.008	0.007
	(Diagnosis reference group is schizophrenia.)	0.525	0.282	0.269	0.437
Baseline Health Care Use in Pre-Baseline Year					
AnyLTC (0-1)	Any Long-Term Care =1	0.021	0.025	0	0.021
INP_SOM_DAYS_Lag1	Inpatient Days for Somatic Disorder	1.451	1.799	1.637	1.465
INP_MH_DAYS_Lag1	Inpatient Days for Mental Disorder	1.065	0.793	0.565	0.887
INP_SUD_DAYS_Lag1	Inpatient Days for Substance Use Disorder	0.107	0.192	0.128	0.119
TIME-VARYING VARIABLES					
SEPROVDIST	Miles to closest SE provider	4.437	4.503	4.585	4.476
CNTY_UN_RATE	Fiscal yr. ave. county unemp. rate	5.526	5.681	5.649	5.579
AGE	Age in years***	40.347	36.946	35.939	39.112
Region of Residence					
WMRES	Residence in Western Maryland	0.054	0.055	0.057	0.056
DC_SUB_RES	Residence in DC Suburbs	0.21	0.174	0.183	0.19
SM_RES	Residence in Southern Maryland	0.045	0.041	0.036	0.043
UP_ES_RES	Upper Eastern Shore Residence	0.021	0.022	0.022	0.02
MID_ES_RES	Middle Eastern Shore Residence	0.025	0.023	0.024	0.024
LOW_ES_RES	Lower Eastern Shore Residence	0.032	0.034	0.038	0.035
	(Baltimore region is reference group.)	0.613	0.651	0.64	0.632

*Regressions also include lnTIME (defined as the logarithm of a linear annual time trend with baseline yr.= 1), and dummies for Cohorts 2 and 3. **Reported value divided by the ratio of the ave. monthly fiscal year CPI-U value to the January 2006 CPI-U value of 198.3. ***Values shown are mean age in FY2002 for all persons with baseline-year data included in the take-up regression.

Table 4: Clog-Log Survival Regressions: Selected Coefficients*									
	Regression 1		Regression 2			Regression 1		Regression 2	
Explanatory Vbles.	Coef.	P**	Coeff	P**	Explanatory Vbles.	Coef.	P**	Coef.	P**
Prior Work History Pre-Baseline					Primary Dx at Baseline				
ERN_Lag1	0.0204	<0.001	0.0204	<0.001	MAJDEP	-0.7484	<0.001	-0.7490	<0.001
MCARE_FLAG	0.2313	<0.001	0.2341	<0.001	BPDIS	-0.3268	<0.001	-0.3258	<0.001
Demographics					DELPSYCH	-0.9041	<0.001	-0.9030	<0.001
AGE***	-0.0315	<0.001	-0.0316	<0.001	SBPD	-0.5068	0.057	-0.5109	0.055
Female	-0.4025	<0.001	-0.4019	<0.001	Chohort, Fiscal Year & Time Vbles.				
Black	0.0152	0.741	0.0025	0.956	Cohort 2	-0.2886	<0.001	-0.2926	<0.001
Hispanic	-0.0434	0.807	-0.0438	0.806	Cohort 3	-0.4759	<0.001	-0.4582	<0.001
OtherNW	-0.1537	0.145	-0.1551	0.141	LnTime (individual)	-0.6473	<0.001	-0.6394	<0.001
Pre-Baseline Health					FY2003	-0.1259	0.281		
AnyLTC	-1.2370	<0.001	-1.2363	<0.001	FY2004	-0.0646	0.707		
INP_SUD_DAYS_Lag1	-0.0044	0.631	-0.0046	0.622	FY2005	0.0383	0.872		
INP_SOM_DAYS_Lag1	-0.0391	<0.001	-0.0392	<0.001	FY2006	-0.0120	0.966		
INP_MH_DAYS_Lag1	0.0057	0.036	0.0056	0.039	FY2007	0.3358	0.282		
Prov. Access/Lab. Mkt.					FY2008	0.3698	0.276		
SEPROVDIST***	-0.0631	<0.001	-0.0627	<0.001	FY2009	0.8439	0.02		
CNTY_UN_RATE***	-0.2473	<0.001	-0.2343	<0.001	FY2010	1.2340	0.001		
					FYTIME			-0.1684	0.101
					FYTIMESQ			0.0312	<0.001
Constant	-0.2924	0.026	-0.2270	0.184	χ^2 FY02-FY10=0	121.34	<0.001		

*Regressions also included 6 time-varying residence region dummies. **P-values are based on 2-tailed t-tests using standard errors robust to clustering. ***Time-varying.

Table 5: Clog-Log Survival Regressions: Selected Estimated Marginal Effects*									
	Regression 1		Regression 2			Regression 1		Regression 2	
Explanatory Vbles.	Coef.	P**	Coeff	P**	Explanatory Vbles.	Coef.	P**	Coef.	P**
Prior Work History Pre-Baseline					Primary Dx at Baseline				
ERN_Lag1	0.000306	<0.001	0.000306	<0.001	MAJDEP	-0.010439	<0.001	-0.010443	<0.001
MCARE_FLAG	0.003603	<0.001	0.003649	<0.001	BPDIS	-0.005499	<0.001	-0.005485	<0.001
Demographics					DELPSYCH	-0.011804	<0.001	-0.011794	<0.001
AGE***	-0.000473	<0.001	-0.000475	<0.001	SBPD	-0.007859	0.015	-0.007908	0.014
Female	-0.006037	<0.001	-0.006030	<0.001	Chohort, Fiscal Yr. & Time Vbles.				
Black	0.000230	0.741	0.000038	0.956	Cohort 2	-0.004271	<0.001	-0.004312	<0.001
Hispanic	-0.000637	0.804	-0.000647	0.802	Cohort 3	-0.0064641	<0.001	-0.006260	<0.001
OtherNW	-0.002143	0.121	-0.002173	0.117	LnTime(individ.)	-0.0097126	<0.001	-0.009594	<0.001
					FY2003	-0.001586	0.327		
Pre-Baseline Health					FY2004	-0.000838	0.715		
AnyLTC	-0.010862	<0.001	-0.010860	<0.001	FY2005	0.000522	0.871		
INP_SUD_DAYS_Lag1	-0.0000658	0.631	-0.000068	0.622	FY2006	-0.000160	0.966		
INP_SOM_DAYS_Lag1	-0.000587	<0.001	-0.000589	<0.001	FY2007	0.005307	0.281		
INP_MH_DAYS_Lag1	0.000085	0.036	0.000084	0.039	FY2008	0.005947	0.282		
Prov. Access/Lab. Mkt.					FY2009	0.017382	0.031		
SEPROVDIST***	-0.000955	<0.001	-0.000941	<0.001	FY2010	0.031413	0.007		
CNTY_UN_RATE***	-0.003711	<0.001	-0.003516	<0.001	FYTIME			0.001284	0.109

*Regressions also included 6 time-varying residence region dummies. **P-values are based on 2-tailed t-tests using standard errors robust to clustering. ***Time-varying.

Impacting Entry into Evidence-Based Supported Employment: A Population-Based Empirical Analysis of a Statewide Public Program: Appendix

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Report on research conducted under Grant R01MH093374 from the National Institute of Mental Health.

Appendix

Table of Contents

I. Data on PMHS Supported Employment Program

Table 1: Maryland PMHS Supported Employment Consumers, Expenditures, Services and Providers

Fiscal Year	Total # of SE Consumers	Total # of SE $'s	Total # of SE Service Claims	Total # of Providers	Total # of SE Sites of Providers	Total # of Fidelity-Certified Providers
2002	1,424	$2,243,716	7,248	23	27	0
2003	1,479	$2,468,599	8,023	25	31	1
2004	1,432	$2,623,786	7,946	24	31	6
2005	1,403	$2,724,155	8,027	28	34	5
2006	1,544	$3,328,346	11,662	28	32	8
2007	1,936	$4,472,145	17,665	30	33	16
2008	2,213	$5,225,609	35,423	29	34	19
2009	2,450	$5,719,407	37,383	30	34	17
2010	2,653	$5,973,279	27,089	32	40	18

Data Sources:
MD Public Mental Health System. Mental Hygiene Administration. (2012).*Public Mental Health System Claims Database.* MD Public Mental Health System. Mental Hygiene Administration. (2013). *Fidelity Assessment Ratings Tracking.*
MD Public Mental Health System. Mental Hygiene Administration. (2013). *Total System Expenditures by Service Group, Coverage Type and Age Group – STATEWIDE*

II. **Determining Primary Diagnosis Groups**
Subjects for this investigation had one or more the following diagnoses AND at least 10 months of Medicaid enrollment in their baseline fiscal year (2002, 2003, or 2004):[18]
295.10 thru 295.95 schizophrenia spectrum

296.33 major depressive disorder, recurrent, severe w/o psychotic features
296.34 major depressive disorder, recurrent, severe with psychotic features

297.1x delusion disorder
298.9x psychotic disorder, nos

301.22 schizotypal personality disorder
301.83 borderline personality disorder

296.43 bi-polar disorder I, manic, severe w/o psychotic features
296.44 bi-polar disorder I, manic, severe w/psychotic features

[18] Fiscal years begin in July of the previous calendar year.

296.53 bi-polar disorder I, dep, severe w/o psychotic features
296.54 bi-polar disorder I, dep, severe w/psychotic features
296.63 bi-polar disorder I, mixed, w/o psychotic features
296.64 bi-polar disorder I, mixed w/psychotic features
296.80 bi-polar disorder dis, NOS
296.89 bi-polar disorder II

These diagnoses correspond to the PMHS definition of the priority population with SMI. (See MHA, PMHS "Appendix C-Priority Populations-Adults" Revised 9/1/03, reviewed 1/25/10.)

The diagnosis indicator used in the study was a 0-1 indictor based on a grouping of these diagnoses into five groups and assigning each subject in a particular year to one of these groups.The groups were defined as follows:

A. Schizophrenia Group - any dx in range 295.10-295.95
B. Major Depression Group- any dx in 296.33 or 296.34
C. Delusional Psychosis Group - any dx beginning with 297.1 or 298.9
D. Schizotypal Personality Disorder/Borderline Personality Disorder Group - any dx in 301.22 or 301.83
E. Bi-polar Disorder Group - any dx in 296.43, 296.44, 296.53, 296.54, 296.63, 296.64, 296.80, or 296.89.

The occurrence of a diagnosis, either primary or secondary, was observed in each Medicaid mental health specialty claim or Medicaid managed care organization encounter record for inpatient or outpatient facility-based services, or for professional services. Note that encounter records capture non-specialty primary health care claims with any of our relevant diagnoses. Note also that each claim or record can include up to 12 different diagnostic code.

For each person, we tabulated every calendar day in the baseline year in which any diagnosis in a particular diagnostic grouping occurred. We then computed the total number of occurrence days in the year for each diagnostic group for each person, and assigned each person to the particular diagnostic group with the largest number of days tallied. (Thus, for each diagnosis group, the number of days did not include multiple tallies in that group for the same day. Multiple claims within the same diagnosis group for the same day would not be tallied as more than 1 day.)

In the very rare cases where two or more groups tied for the highest number of tallied days, primary diagnosis was assigned on the basis of the following hierarchy: schizophrenia (group A), bi-polar disorders (group E), major depression (group B), delusions psychoses (group C), and schizotypal personality disorder/borderline personality disorder (group D). The order of this hierarchy is based on the ranking of the median days of inpatient or outpatient services use in our population of the "purely" diagnosed claims (i.e., just one diagnostic group) fiscal 2002. The rationale is that median population day counts are a proxy for relative "severity/intensity" of illness.

III. Data Sources

Table 2: Study Data Sources

Data Group or Variable Type	Source
Demographics (age, gender, race)	.Maryland Medicaid enrollment files.
Supported Employment Service Use (take-up indicator, inpatient mental health days)	PMHS claims files
Other Medical and Substance Abuse Service Use(pre-baseline days and long-term care use)	Maryland Medicaid claims and encounter files
Enrollment Months (Medicaid, Medicare)	Maryland Medicaid enrollment files.
Region and County of Residence	Maryland Medicaid enrollment files.
Distance to Supported Emp. Providers	Maryland Medicaid enrollment files (for residence location data) and PMHS provider data (for locations)
Diagnosis	Maryland Medicaid claims and encounter files/PMHS claims)
County Unemployment Rate	BLS-LAUS
Earnings	Maryland Dept. of Labor, Licensing and Regulation

IV. Full Regression Results and Sensitivity Analyses: Pooled Regressions

IV.1 FULL RESULTS FROM REGRESSION 1 FOR TABLES 4 AND 5 - COEFFICIENTS, MARGINAL EFFECTS,FIT STTISTICS, JOINT X^2-TEST FOR ALL FY DUMMIES, AND X^2-TEST FOR ALL RACE CATEGORIES

********POOLED REGRESSION WITH lntime FOR INDIVDUALS' HAZARD TREND AND FY DUMMIES******

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_prior_fy i
> np_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender clst_prov_dist i.region i.pos_
> mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy lntime  i.cohort_pooled ib2002.fiscal_year c
> ntyfyurate, vce(cluster maskid)

Iteration 0:   log pseudolikelihood = -12518.764
Iteration 1:   log pseudolikelihood = -12518.011
Iteration 2:   log pseudolikelihood = -12518.009
Iteration 3:   log pseudolikelihood = -12518.009

Complementary log-log regression                Number of obs     =    170,202
                                                Zero outcomes     =    167,610
                                                Nonzero outcomes  =      2,592

                                                Wald chi2(34)     =    1707.31
```

```
Log pseudolikelihood = -12518.009               Prob > chi2       =     0.0000
                                        (Std. Err. adjusted for 26,361 clusters in maskid)
------------------------------------------------------------------------------------------
                         |               Robust
                take_up |      Coef.   Std. Err.       z    P>|z|     [95% Conf. Interval]
-------------------------+----------------------------------------------------------------
prior_yr_scaled_all_ern~f |   .0204065   .0033881     6.02   0.000      .013766    .0270471
     1.ltc_dummy_prior_fy |  -1.236973   .3108662    -3.98   0.000     -1.84626   -.6276865
    inp_sud_days_prior_fy |  -.0043829   .0091199    -0.48   0.631    -.0222577    .0134918
inp_somatic_days_prior_fy |  -.0391381   .0103324    -3.79   0.000    -.0593893   -.0188869
    inp_smh_days_prior_fy |    .005651     .00269     2.10   0.036     .0003788    .0109233
                      age |   -.031528   .0019297   -16.34   0.000    -.0353102   -.0277457
                         |
                   gender |
                   Female  |  -.4025228   .0422928    -9.52   0.000    -.4854152   -.3196304
            clst_prov_dist |  -.0631208   .0063819    -9.89   0.000    -.0756292   -.0506124
                         |
                   region |
        Western Maryland  |   .3979187   .0817894     4.87   0.000     .2376145     .558223
              DC Suburbs  |  -.0723218   .0561287    -1.29   0.198    -.1823321    .0376885
       Southern Maryland  |    .014459     .09941     0.15   0.884     -.180381    .2092989
     Upper Eastern Shore  |   .5319174   .1122911     4.74   0.000     .3118309    .7520039
    Middle Eastern Shore  |   .4883876   .1386082     3.52   0.000     .2167207    .7600546
     Lower Eastern Shore  |   .0625026   .1263193     0.49   0.621    -.1850786    .3100839
                         |
                         |
   pos_mcare_mos_prior_fy |
           Some Medicare  |   .2313416   .0445954     5.19   0.000     .1439362    .3187471
                         |
                race_abrg |
                   Black  |   .0151981   .0459468     0.33   0.741     -.074856    .1052523
                Hispanic  |  -.0433502   .1779129    -0.24   0.807    -.3920531    .3053527
                   Other  |  -.1537126   .1053592    -1.46   0.145    -.3602129    .0527877
                         |
            mdg_prior_fy |
        Major Depression  |  -.7484307   .0627373   -11.93   0.000    -.8713935   -.6254679
      Bi-Polar Disorder   |  -.3268014   .0572188    -5.71   0.000    -.4389481   -.2146547
    Delusional Psychosis  |   -.904144   .0880766   -10.27   0.000    -1.076771   -.7315169
Schizotypal Borderline..  |  -.5067691   .2667286    -1.90   0.057    -1.029548    .0160094
                         |
                  lntime |  -.6473471   .1609133    -4.02   0.000    -.9627313   -.3319629
                         |
            cohort_pooled |
             2003 Cohort  |  -.2886482   .0814469    -3.54   0.000    -.4482811   -.1290153
             2004 Cohort  |  -.4759205   .1231136    -3.87   0.000    -.7172187   -.2346222
              fiscal year |
                    2003  |  -.1259319   .1167555    -1.08   0.281    -.3547685    .1029046
                    2004  |   -.064602   .1717203    -0.38   0.707    -.4011676    .2719637
                    2005  |   .0382809    .237238     0.16   0.872     -.426697    .5032588
                    2006  |  -.0120254   .2804082    -0.04   0.966    -.5616154    .5375646
                    2007  |   .3357892   .3124134     1.07   0.282    -.2765298    .9481082
                    2008  |   .3698227   .3393594     1.09   0.276    -.2953096    1.034955
                    2009  |   .8438883   .3614873     2.33   0.020     .1353861     1.55239
                    2010  |   1.234003   .3872125     3.19   0.001     .4750804    1.992925
                         |
             cntyfyurate |  -.2473244   .0189235   -13.07   0.000    -.2844138    -.210235
                   _cons |  -.2924406   .1312033    -2.23   0.026    -.5495943   -.0352869
------------------------------------------------------------------------------------------
. margins, dydx(*) noestimcheck

Average marginal effects                        Number of obs     =    170,202
Model VCE    : Robust

Expression   : Pr(take_up), predict()
dy/dx w.r.t. : prior_yr_scaled_all_erngs_def 1.ltc_dummy_prior_fy inp_sud_days_prior_fy
               inp_somatic_days_prior_fy inp_smh_days_prior_fy age 1.gender clst_prov_dist
               2.region 3.region 4.region 5.region 6.region 7.region
               1.pos_mcare_mos_prior_fy 2.race_abrg 3.race_abrg 4.race_abrg 2.mdg_prior_fy
               3.mdg_prior_fy 4.mdg_prior_fy 5.mdg_prior_fy lntime 1.cohort_pooled
               2.cohort_pooled 2003.fiscal_year 2004.fiscal_year 2005.fiscal_year
               2006.fiscal_year 2007.fiscal_year 2008.fiscal_year 2009.fiscal_year
```

2010.fiscal_year cntyfyurate

	Delta-method				
	dy/dx	Std. Err.	z	P>|z|	[95% Conf. Interval]
prior_yr_scaled_all_ern~f	.0003062	.0000513	5.97	0.000	.0002056 .0004067
1.ltc_dummy_prior_fy	-.0108624	.0014237	-7.63	0.000	-.0136528 -.008072
inp_sud_days_prior_fy	-.0000658	.0001368	-0.48	0.631	-.000334 .0002024
inp_somatic_days_prior_fy	-.0005872	.0001554	-3.78	0.000	-.0008917 -.0002827
inp_smh_days_prior_fy	.0000848	.0000404	2.10	0.036	5.62e-06 .0001639
age	-.000473	.0000302	-15.66	0.000	-.0005322 -.0004138
gender					
Female	-.0060389	.0006393	-9.45	0.000	-.0072918 -.0047859
clst_prov_dist	-.000947	.0000971	-9.75	0.000	-.0011374 -.0007566
region					
Western Maryland	.0070783	.001711	4.14	0.000	.0037249 .0104318
DC Suburbs	-.0010186	.0007807	-1.30	0.192	-.0025487 .0005115
Southern Maryland	.0002124	.0014682	0.14	0.885	-.0026653 .0030901
Upper Eastern Shore	.0101393	.0026763	3.79	0.000	.0048939 .0153847
Middle Eastern Shore	.0091017	.0031924	2.85	0.004	.0028448 .0153586
Lower Eastern Shore	.0009398	.0019522	0.48	0.630	-.0028865 .0047661
pos_mcare_mos_prior_fy					
Some Medicare	.0036032	.0007223	4.99	0.000	.0021876 .0050189
race_abrg					
Black	.0002298	.000695	0.33	0.741	-.0011324 .001592
Hispanic	-.0006371	.0025638	-0.25	0.804	-.005662 .0043877
Other	-.002143	.0013813	-1.55	0.121	-.0048503 .0005642
mdg_prior_fy					
Major Depression	-.0104388	.000776	-13.45	0.000	-.0119596 -.0089179
Bi-Polar Disorder	-.0054994	.0009095	-6.05	0.000	-.0072819 -.0037169
Delusional Psychosis	-.0118043	.0008626	-13.68	0.000	-.0134949 -.0101137
Schizotypal Borderline..	-.0078589	.0032305	-2.43	0.015	-.0141906 -.0015272
lntime	-.0097123	.0024207	-4.01	0.000	-.0144568 -.0049679
cohort_pooled					
2003 Cohort	-.0042718	.001174	-3.64	0.000	-.0065728 -.0019708
2004 Cohort	-.0064656	.0015215	-4.25	0.000	-.0094476 -.0034836
fiscal_year					
2003	-.0015862	.0016189	-0.98	0.327	-.0047593 .0015868
2004	-.0008379	.0022909	-0.37	0.715	-.005328 .0036521
2005	.0005219	.0032109	0.16	0.871	-.0057714 .0068151
2006	-.00016	.0037343	-0.04	0.966	-.0074791 .0071592
2007	.005307	.0049265	1.08	0.281	-.0043488 .0149628
2008	.0059468	.0055311	1.08	0.282	-.004894 .0167875
2009	.0173816	.0080764	2.15	0.031	.0015522 .033211
2010	.0314129	.0117356	2.68	0.007	.0084116 .0544142
cntyfyurate	-.0037107	.0002915	-12.73	0.000	-.004282 -.0031393

Note: dy/dx for factor levels is the discrete change from the base level.

```
. test 2003.fiscal_year 2004.fiscal_year 2005.fiscal_year 2006.fiscal_year 2007.fiscal_year
> 2008.fiscal_year 2009.fiscal_year 2010.fiscal_year


 ( 1)  [take_up]2003.fiscal_year = 0
 ( 2)  [take_up]2004.fiscal_year = 0
 ( 3)  [take_up]2005.fiscal_year = 0
 ( 4)  [take_up]2006.fiscal_year = 0
 ( 5)  [take_up]2007.fiscal_year = 0
 ( 6)  [take_up]2008.fiscal_year = 0
 ( 7)  [take_up]2009.fiscal_year = 0
 ( 8)  [take_up]2010.fiscal_year = 0
```

```
          chi2(  8) =  121.34
        Prob > chi2 =    0.0000

. test 2.race_abrg 3.race_abrg 4.race_abrg

 ( 1)  [take_up]2.race_abrg = 0
 ( 2)  [take_up]3.race_abrg = 0
 ( 3)  [take_up]4.race_abrg = 0

          chi2(  3) =    2.61
        Prob > chi2 =    0.4553
```

IV.2 FULL RESULTS FROM REGRESSION 2 FOR TABLES 4 AND 5- COEFFICIENTS, MARGINAL EFFECTS, AIC, JOINT TESTS FOR RACE CATEGORIES, AND JOINT TESTS FOR FYTIME & FYTIMESQ

*****POOLED REGRESSION WITH LNtime FOR INIDIVDUALS' HAZARD TREND AND FYTIME AND FYTIMESQ****

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_prior_fy i
> np_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender clst_prov_dist i.region i.pos_
> mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy lntime  i.cohort_pooled c.fytime##c.fytime c
> ntyfyurate, vce(cluster maskid)

Iteration 0:   log pseudolikelihood = -12523.731
Iteration 1:   log pseudolikelihood = -12523.106
Iteration 2:   log pseudolikelihood = -12523.105

Complementary log-log regression                Number of obs     =    170,202
                                                Zero outcomes     =    167,610
                                                Nonzero outcomes  =      2,592

                                                Wald chi2(28)     =    1694.00
Log pseudolikelihood = -12523.105               Prob > chi2       =     0.0000

                                      (Std. Err. adjusted for 26,361 clusters in maskid)
------------------------------------------------------------------------------------------
                         |               Robust
                take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------------+----------------------------------------------------------------
prior_yr_scaled_all_ern~f |   .0203926   .0033985     6.00   0.000     .0137317    .0270535
     1.ltc_dummy_prior_fy |  -1.236365   .3108984    -3.98   0.000    -1.845714   -.6270148
    inp_sud_days_prior_fy |  -.0045561   .0092375    -0.49   0.622    -.0226613    .0135491
inp_somatic_days_prior_fy |  -.0392402   .0103459    -3.79   0.000    -.0595178   -.0189626
    inp_smh_days_prior_fy |   .0055635   .0026915     2.07   0.039     .0002883    .0108387
                      age |  -.0316455   .0019283   -16.41   0.000    -.0354249   -.0278661
                          |
                   gender |
                   Female |  -.4018982   .0422789    -9.51   0.000    -.4847633   -.3190331
            clst_prov_dist |   -.062718   .0063561    -9.87   0.000    -.0751757   -.0502604
                          |
                   region |
         Western Maryland |   .3931812   .0815888     4.82   0.000       .23327    .5530923
               DC Suburbs |  -.0516633   .0540822    -0.96   0.339    -.1576626    .0543359
       Southern Maryland  |   .0369062   .0980961     0.38   0.707    -.1553587     .229171
     Upper Eastern Shore  |    .539932   .1124171     4.80   0.000     .3195985    .7602655
    Middle Eastern Shore  |   .4877619   .1386183     3.52   0.000     .2160751    .7594488
     Lower Eastern Shore  |   .0649154   .1263691     0.51   0.607    -.1827635    .3125944
                          |
   pos_mcare_mos_prior_fy |
          Some Medicare   |   .2341447   .0445268     5.26   0.000     .1468738    .3214157
                          |
                race_abrg |
```

```
                  Black  |   .0024966   .0450932     0.06   0.956    -.0858844    .0908777
               Hispanic  |  -.0438011   .1779149    -0.25   0.806    -.3925078    .3049056
                  Other  |   -.155101   .1053433    -1.47   0.141    -.3615701    .0513681
                         |
            mdg_prior_fy |
        Major Depression  |  -.7490358   .0627234   -11.94   0.000    -.8719714   -.6261003
      Bi-Polar Disorder  |   -.325809   .0571854    -5.70   0.000    -.4378903   -.2137277
    Delusional Psychosis  |   -.903008   .0880836   -10.25   0.000    -1.075649   -.7303672
Schizotypal Borderline..  |  -.5109474   .2666425    -1.92   0.055    -1.033557    .0116623
                         |
                  lntime |  -.6394206   .1545333    -4.14   0.000    -.9423002    -.336541
                         |
           cohort_pooled |
            2003 Cohort  |  -.2925762   .0780235    -3.75   0.000    -.4454995    -.139653
            2004 Cohort  |  -.4582032    .118934    -3.85   0.000    -.6913094   -.2250969
                         |
                  fytime |  -.1683511   .1026811    -1.64   0.101    -.3696022    .0329001
                         |
       c.fytime#c.fytime |   .0311852   .0067303     4.63   0.000     .0179939    .0443764
                         |
             cntyfyurate |  -.2342631   .0166259   -14.09   0.000    -.2668493   -.2016769
                   _cons |  -.2270336   .1708834    -1.33   0.184     -.561959    .1078918
------------------------------------------------------------------------------------------

. margins, dydx(*) noestimcheck

Average marginal effects                        Number of obs     =    170,202
Model VCE    : Robust

Expression   : Pr(take_up), predict()
dy/dx w.r.t. : prior_yr_scaled_all_erngs_def 1.ltc_dummy_prior_fy inp_sud_days_prior_fy
               inp_somatic_days_prior_fy inp_smh_days_prior_fy age 1.gender clst_prov_dist
               2.region 3.region 4.region 5.region 6.region 7.region
               1.pos_mcare_mos_prior_fy 2.race_abrg 3.race_abrg 4.race_abrg 2.mdg_prior_fy
               3.mdg_prior_fy 4.mdg_prior_fy 5.mdg_prior_fy lntime 1.cohort_pooled
               2.cohort_pooled fytime cntyfyurate

------------------------------------------------------------------------------------------
                         |            Delta-method
                         |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------------+----------------------------------------------------------------
prior_yr_scaled_all_ern~f |    .000306   .0000515     5.95   0.000     .0002051    .0004068
     1.ltc_dummy_prior_fy |  -.0108597   .0014246    -7.62   0.000    -.0136518   -.0080675
    inp_sud_days_prior_fy |  -.0000684   .0001386    -0.49   0.622      -.00034    .0002033
inp_somatic_days_prior_fy |  -.0005888   .0001556    -3.78   0.000    -.0008937   -.0002838
    inp_smh_days_prior_fy |   .0000835   .0000404     2.07   0.039     4.27e-06    .0001627
                      age |  -.0004748   .0000302   -15.73   0.000     -.000534   -.0004157
                         |
                   gender |
                   Female  |  -.0060295    .000639    -9.44   0.000     -.007282   -.0047771
            clst_prov_dist |   -.000941   .0000967    -9.73   0.000    -.0011306   -.0007514
                         |
                   region |
         Western Maryland  |   .0069332   .0016848     4.12   0.000     .0036311    .0102353
               DC Suburbs  |  -.0007302   .0007575    -0.96   0.335    -.0022149    .0007545
         Southern Maryland  |   .0005445   .0014683     0.37   0.711    -.0023333    .0034223
       Upper Eastern Shore  |   .0102705   .0026825     3.83   0.000     .0050129    .0155281
      Middle Eastern Shore  |   .0090302     .00317     2.85   0.004     .0028171    .0152432
       Lower Eastern Shore  |    .000971   .0019449     0.50   0.618    -.0028409    .0047829
                         |
   pos_mcare_mos_prior_fy |
           Some Medicare  |   .0036491    .000722     5.05   0.000      .002234    .0050643
                         |
                 race_abrg |
                   Black  |   .0000377   .0006814     0.06   0.956    -.0012979    .0013733
                Hispanic  |  -.0006472    .002577    -0.25   0.802    -.0056981    .0044036
                   Other  |  -.0021731    .001387    -1.57   0.117    -.0048916    .0005454
                         |
            mdg_prior_fy |
        Major Depression  |  -.0104434   .0007754   -13.47   0.000    -.0119632   -.0089236
      Bi-Polar Disorder  |  -.0054848   .0009094    -6.03   0.000    -.0072671   -.0037024
```

```
    Delusional Psychosis  |  -.0117938   .0008631   -13.66   0.000    -.0134856   -.0101021
Schizotypal Borderline..  |  -.0079081   .0032163    -2.46   0.014     -.014212   -.0016043
                          |
                   lntime |   -.009594   .0023252    -4.13   0.000    -.0141513   -.0050366
                          |
            cohort_pooled |
             2003 Cohort  |  -.0043121   .0011188    -3.85   0.000    -.0065048   -.0021193
             2004 Cohort  |  -.0062602   .0014795    -4.23   0.000      -.00916   -.0033603
                          |
                  fytime |   .0012841    .000802     1.60   0.109    -.0002878     .002856
               cntyfyurate |  -.0035149   .0002572   -13.66   0.000    -.0040191   -.0030107
------------------------------------------------------------------------------------------
Note: dy/dx for factor levels is the discrete change from the base level.


. test 2.race_abrg 3.race_abrg 4.race_abrg

 ( 1)  [take_up]2.race_abrg = 0
 ( 2)  [take_up]3.race_abrg = 0
 ( 3)  [take_up]4.race_abrg = 0

           chi2(  3) =    2.35
         Prob > chi2 =    0.5031

. test fytime fytimesq

 ( 1)  [take_up]fytime = 0
 ( 2)  [take_up]fytimesq = 0

           chi2(  2) =  110.02
         Prob > chi2 =    0.0000
```

IV.3 FULL RESULTS FROM POOLED REGRESSION WITH lntime FOR INDIVDUALS' HAZARD TREND AND FYTIME BUT NOT FYTIMESQ

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_prior_fy i
> np_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender clst_prov_dist i.region i.pos_
> mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy lntime  i.cohort_pooled fytime cntyfyurate,
> vce(cluster maskid)

Iteration 0:   log pseudolikelihood = -12534.336
Iteration 1:   log pseudolikelihood = -12533.868
Iteration 2:   log pseudolikelihood = -12533.867

Complementary log-log regression                Number of obs     =    170,202
                                                Zero outcomes     =    167,610
                                                Nonzero outcomes  =      2,592

                                                Wald chi2(27)     =    1613.65
Log pseudolikelihood = -12533.867               Prob > chi2       =     0.0000

                                      (Std. Err. adjusted for 26,361 clusters in maskid)
------------------------------------------------------------------------------------------
                          |               Robust
                 take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------------+---------------------------------------------------------------
prior_yr_scaled_all_ern~f |   .0203335   .0034288     5.93   0.000     .0136132    .0270538
     1.ltc_dummy_prior_fy |  -1.233081   .3109877    -3.97   0.000    -1.842606   -.6235565
    inp_sud_days_prior_fy |  -.0046954   .0094315    -0.50   0.619    -.0231807      .01379
inp_somatic_days_prior_fy |  -.0392845   .0103423    -3.80   0.000    -.0595551   -.0190139
    inp_smh_days_prior_fy |   .0054522   .0027091     2.01   0.044     .0001425    .0107619
                      age |  -.0319655   .0019265   -16.59   0.000    -.0357414   -.0281896
                          |
                   gender |
                   Female |  -.4005237   .0422433    -9.48   0.000    -.4833191   -.3177283
            clst_prov_dist |  -.0620273   .0063137    -9.82   0.000     -.074402   -.0496526
                          |
                   region |
         Western Maryland |   .3830616   .0816912     4.69   0.000     .2229497    .5431735
```

```
             DC Suburbs  |  -.0110728   .0541403    -0.20   0.838    -.1171858    .0950402
       Southern Maryland  |   .0824867   .0984669     0.84   0.402    -.1105049    .2754782
     Upper Eastern Shore  |   .5548983   .1127427     4.92   0.000     .3339266      .77587
    Middle Eastern Shore  |   .4841096   .1385783     3.49   0.000     .2125011     .755718
     Lower Eastern Shore  |   .0666619   .1265084     0.53   0.598      -.18129    .3146138
                          |
   pos_mcare_mos_prior_fy |
           Some Medicare  |   .2407477   .0445023     5.41   0.000     .1535248    .3279705
                          |
                race_abrg |
                   Black  |  -.0214696   .0451409    -0.48   0.634    -.1099443     .067005
                Hispanic  |  -.0458716    .178171    -0.26   0.797    -.3950804    .3033372
                   Other  |  -.1569133   .1053245    -1.49   0.136    -.3633456     .049519
                          |
             mdg_prior_fy |
       Major Depression   |  -.7500124   .0627041   -11.96   0.000    -.8729101   -.6271147
      Bi-Polar Disorder   |  -.3235205    .057143    -5.66   0.000    -.4355187   -.2115222
    Delusional Psychosis  |  -.8996451   .0880484   -10.22   0.000    -1.072217   -.7270734
Schizotypal Borderline..  |  -.5200602   .2662412    -1.95   0.051    -1.041883     .001763
                          |
                  lntime  |  -1.205581   .0947877   -12.72   0.000    -1.391361     -1.0198
                          |
            cohort_pooled |
             2003 Cohort  |  -.5137422     .06158    -8.34   0.000    -.6344367   -.3930477
             2004 Cohort  |  -.8714676   .0826165   -10.55   0.000    -1.033393   -.7095424
                          |
                  fytime  |   .2862443   .0304712     9.39   0.000     .2265218    .3459667
              cntyfyurate |  -.2075343   .0156923   -13.23   0.000    -.2382908   -.1767779
                    _cons |  -.8245011   .1152884    -7.15   0.000    -1.050462   -.5985401
------------------------------------------------------------------------------------------

. margins, dydx(*) noestimcheck

Average marginal effects                        Number of obs     =    170,202
Model VCE    : Robust

Expression   : Pr(take_up), predict()
dy/dx w.r.t. : prior_yr_scaled_all_erngs_def 1.ltc_dummy_prior_fy inp_sud_days_prior_fy
               inp_somatic_days_prior_fy inp_smh_days_prior_fy age 1.gender clst_prov_dist
               2.region 3.region 4.region 5.region 6.region 7.region
               1.pos_mcare_mos_prior_fy 2.race_abrg 3.race_abrg 4.race_abrg 2.mdg_prior_fy
               3.mdg_prior_fy 4.mdg_prior_fy 5.mdg_prior_fy lntime 1.cohort_pooled
               2.cohort_pooled fytime cntyfyurate

------------------------------------------------------------------------------------------
                          |            Delta-method
                          |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------------+---------------------------------------------------------------
prior_yr_scaled_all_ern~f |   .0003052   .0000519     5.88   0.000     .0002034     .000407
     1.ltc_dummy_prior_fy |  -.0108458   .0014294    -7.59   0.000    -.0136473   -.0080443
    inp_sud_days_prior_fy |  -.0000705   .0001416    -0.50   0.619    -.0003479     .000207
inp_somatic_days_prior_fy |  -.0005896   .0001556    -3.79   0.000    -.0008945   -.0002847
    inp_smh_days_prior_fy |   .0000818   .0000407     2.01   0.044     2.08e-06    .0001616
                      age |  -.0004798   .0000302   -15.89   0.000    -.0005389   -.0004206
                          |
                   gender |
                   Female |  -.0060098   .0006385    -9.41   0.000    -.0072612   -.0047584
            clst_prov_dist |  -.0009309   .0000961    -9.69   0.000    -.0011193   -.0007426
                          |
                   region |
         Western Maryland |   .0066405   .0016508     4.02   0.000     .0034049     .009876
               DC Suburbs |  -.0001577   .0007694    -0.20   0.838    -.0016657    .0013504
         Southern Maryland |   .0012296   .0015159     0.81   0.417    -.0017414    .0042006
       Upper Eastern Shore |   .0105134   .0026968     3.90   0.000     .0052279     .015799
      Middle Eastern Shore |   .0088405   .0031219     2.83   0.005     .0027217    .0149593
       Lower Eastern Shore |    .000986   .0019269     0.51   0.609    -.0027906    .0047627
                          |
   pos_mcare_mos_prior_fy |
           Some Medicare  |   .0037579   .0007237     5.19   0.000     .0023394    .0051764
                          |
                race_abrg |
```

```
                  Black  |  -.0003242   .0006813    -0.48   0.634    -.0016595    .0010112
               Hispanic  |  -.0006845   .0026036    -0.26   0.793    -.0057875    .0044185
                  Other  |  -.0022203   .0013996    -1.59   0.113    -.0049635    .0005228
                         |
            mdg_prior_fy |
       Major Depression  |  -.0104486   .0007744   -13.49   0.000    -.0119665   -.0089308
     Bi-Polar Disorder   |  -.0054501   .0009097    -5.99   0.000     -.007233   -.0036673
    Delusional Psychosis |  -.0117618   .0008643   -13.61   0.000    -.0134557   -.0100679
Schizotypal Borderline.. |  -.0080136   .0031826    -2.52   0.012    -.0142513   -.0017759
                         |
                  lntime |  -.0180939   .0014583   -12.41   0.000    -.0209522   -.0152356
                         |
           cohort_pooled |
            2003 Cohort  |  -.0077701   .0008774    -8.86   0.000    -.0094899   -.0060504
            2004 Cohort  |  -.0112896   .0009347   -12.08   0.000    -.0131215   -.0094576
                         |
                  fytime |   .0042961   .0004636     9.27   0.000     .0033875    .0052047
               cntyfyurate |  -.0031148    .000242   -12.87   0.000    -.0035891   -.0026404
------------------------------------------------------------------------------------------
Note: dy/dx for factor levels is the discrete change from the base level.


. test 2.race_abrg 3.race_abrg 4.race_abrg

 ( 1)  [take_up]2.race_abrg = 0
 ( 2)  [take_up]3.race_abrg = 0
 ( 3)  [take_up]4.race_abrg = 0

           chi2(  3) =    2.26
         Prob > chi2 =    0.5207
```

IV.4 REGRESSION IV.1 WITH INVTIME (= 1/TIME) INSTEAD OF LNTIME

*****POOLED REGRESSION WITH invtime FOR INDIVDUALS' HAZARD TREND AND FY DUMMIES****

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_prior_fy i
> np_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender clst_prov_dist i.region i.pos_
> mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy invtime  i.cohort_pooled ib2002.fiscal_year
> cntyfyurate, vce(cluster maskid)

Iteration 0:   log pseudolikelihood = -12520.295
Iteration 1:   log pseudolikelihood = -12519.541
Iteration 2:   log pseudolikelihood =  -12519.54
Iteration 3:   log pseudolikelihood =  -12519.54

Complementary log-log regression                Number of obs     =    170,202
                                                Zero outcomes     =    167,610
                                                Nonzero outcomes  =      2,592

                                                Wald chi2(34)     =    1706.62
Log pseudolikelihood =  -12519.54               Prob > chi2       =     0.0000

                                      (Std. Err. adjusted for 26,361 clusters in maskid)
------------------------------------------------------------------------------------------
                         |               Robust
                  take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------------+----------------------------------------------------------------
prior_yr_scaled_all_ern~f |   .0204129    .003388     6.02   0.000     .0137724    .0270533
     1.ltc_dummy_prior_fy |  -1.237447   .3108419    -3.98   0.000    -1.846686   -.6282082
    inp_sud_days_prior_fy |   -.004386   .0091221    -0.48   0.631    -.0222651     .013493
inp_somatic_days_prior_fy |   -.039156   .0103358    -3.79   0.000    -.0594138   -.0188981
    inp_smh_days_prior_fy |   .0056526   .0026896     2.10   0.036      .000381    .0109241
                      age |  -.0315219   .0019295   -16.34   0.000    -.0353037   -.0277401
                         |
                   gender |
                   Female  |  -.4026813   .0422932    -9.52   0.000    -.4855744   -.3197882
           clst_prov_dist |  -.0631018   .0063807    -9.89   0.000    -.0756076   -.0505959
                         |
```

```
                region |
       Western Maryland |   .3978703   .0817919     4.86   0.000     .2375611    .5581795
             DC Suburbs |  -.0722956   .0561289    -1.29   0.198    -.1823061     .037715
       Southern Maryland |    .014171   .0994052     0.14   0.887    -.1806596    .2090017
     Upper Eastern Shore |   .5321364   .1123001     4.74   0.000     .3120323    .7522405
    Middle Eastern Shore |   .4884907   .1386223     3.52   0.000      .216796    .7601855
     Lower Eastern Shore |   .0621597   .1263063     0.49   0.623    -.1853961    .3097154
                         |
   pos_mcare_mos_prior_fy |
           Some Medicare |   .2311085   .0445931     5.18   0.000     .1437077    .3185093
                         |
               race_abrg |
                   Black |   .0151293   .0459441     0.33   0.742    -.0749196    .1051782
                Hispanic |  -.0431518   .1778942    -0.24   0.808    -.3918181    .3055144
                   Other |  -.1536596    .105364    -1.46   0.145    -.3601692    .0528501
                         |
            mdg_prior_fy |
        Major Depression |  -.7481359   .0627354   -11.93   0.000     -.871095   -.6251768
       Bi-Polar Disorder |  -.3265988   .0572197    -5.71   0.000    -.4387473   -.2144502
    Delusional Psychosis |  -.9042181   .0880788   -10.27   0.000    -1.076849   -.7315869
Schizotypal Borderline.. |  -.5069844   .2667728    -1.90   0.057    -1.029849    .0158806
                         |
                 invtime |   .6822712    .188571     3.62   0.000     .3126789    1.051864
                         |
           cohort_pooled |
            2003 Cohort  |  -.1808096   .0671036    -2.69   0.007    -.3123302    -.049289
            2004 Cohort  |  -.2536139   .0842668    -3.01   0.003    -.4187738   -.0884541
                         |
             fiscal_year |
                   2003  |  -.2336049     .10202    -2.29   0.022    -.4335604   -.0336494
                   2004  |  -.3039367   .1287181    -2.36   0.018    -.5562196   -.0516538
                   2005  |  -.3313516   .1652476    -2.01   0.045     -.655231   -.0074722
                   2006  |  -.5044606   .1815933    -2.78   0.005    -.8603768   -.1485443
                   2007  |  -.2608304   .1884812    -1.38   0.166    -.6302468     .108586
                   2008  |  -.3169184   .1948898    -1.63   0.104    -.6988954    .0650585
                   2009  |   .0779235   .2014257     0.39   0.699    -.3168636    .4727106
                   2010  |    .397418   .2142918     1.85   0.064    -.0225861    .8174222
                         |
            cntyfyurate  |  -.2473657   .0189235   -13.07   0.000    -.2844551   -.2102764
                  _cons  |  -.9746782   .2297371    -4.24   0.000    -1.424955   -.5244017
------------------------------------------------------------------------------------------

.
. maargins, dydx(*) noestimcheck
command maargins is unrecognized
r(199);

. margins, dydx(*) noestimcheck

Average marginal effects                        Number of obs     =    170,202
Model VCE    : Robust

Expression   : Pr(take_up), predict()
dy/dx w.r.t. : prior_yr_scaled_all_erngs_def 1.ltc_dummy_prior_fy inp_sud_days_prior_fy
               inp_somatic_days_prior_fy inp_smh_days_prior_fy age 1.gender clst_prov_dist
               2.region 3.region 4.region 5.region 6.region 7.region
               1.pos_mcare_mos_prior_fy 2.race_abrg 3.race_abrg 4.race_abrg 2.mdg_prior_fy
               3.mdg_prior_fy 4.mdg_prior_fy 5.mdg_prior_fy invtime 1.cohort_pooled
               2.cohort_pooled 2003.fiscal_year 2004.fiscal_year 2005.fiscal_year
               2006.fiscal_year 2007.fiscal_year 2008.fiscal_year 2009.fiscal_year
               2010.fiscal_year cntyfyurate

------------------------------------------------------------------------------------------
                         |            Delta-method
                         |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------------+----------------------------------------------------------------
prior_yr_scaled_all_ern~f |   .0003063   .0000513     5.97   0.000     .0002057    .0004068
     1.ltc_dummy_prior_fy |  -.0108646    .001423    -7.64   0.000    -.0136536   -.0080756
    inp_sud_days_prior_fy |  -.0000658   .0001369    -0.48   0.631    -.0003341    .0002025
inp_somatic_days_prior_fy |  -.0005875   .0001554    -3.78   0.000    -.0008921   -.0002828
    inp_smh_days_prior_fy |   .0000848   .0000404     2.10   0.036     5.66e-06     .000164
```

```
                     age |  -.0004729   .0000302   -15.66   0.000    -.0005321   -.0004138
                         |
                  gender |
                  Female |  -.0060413   .0006393    -9.45   0.000    -.0072944   -.0047883
            clst_prov_dist |  -.0009467   .0000971    -9.75   0.000    -.0011371   -.0007564
                         |
                  region |
        Western Maryland |   .0070775    .001711     4.14   0.000     .0037239     .010431
              DC Suburbs |  -.0010183   .0007807    -1.30   0.192    -.0025484    .0005119
      Southern Maryland  |   .0002081   .0014678     0.14   0.887    -.0026688     .003085
     Upper Eastern Shore |   .0101449   .0026771     3.79   0.000     .0048978     .015392
    Middle Eastern Shore |   .0091044   .0031931     2.85   0.004      .002846    .0153627
     Lower Eastern Shore |   .0009345   .0019514     0.48   0.632    -.0028902    .0047593
                         |
   pos_mcare_mos_prior_fy |
           Some Medicare |   .0035995   .0007222     4.98   0.000      .002184     .005015
                         |
               race_abrg |
                  Black  |   .0002288    .000695     0.33   0.742    -.0011333    .0015909
                Hispanic |  -.0006343   .0025641    -0.25   0.805    -.0056598    .0043912
                   Other |  -.0021424   .0013815    -1.55   0.121      -.00485    .0005652
                         |
            mdg_prior_fy |
       Major Depression  |  -.0104351    .000776   -13.45   0.000     -.011956   -.0089142
      Bi-Polar Disorder  |  -.0054961   .0009095    -6.04   0.000    -.0072787   -.0037135
    Delusional Psychosis |  -.0118039   .0008625   -13.69   0.000    -.0134944   -.0101135
Schizotypal Borderline.. |  -.0078608   .0032301    -2.43   0.015    -.0141917   -.0015299
                         |
                 invtime |   .0102364   .0028352     3.61   0.000     .0046796    .0157932
                         |
           cohort_pooled |
            2003 Cohort  |  -.0026593   .0009512    -2.80   0.005    -.0045236   -.0007951
            2004 Cohort  |  -.0036048   .0011222    -3.21   0.001    -.0058043   -.0014053
                         |
             fiscal_year |
                  2003   |  -.0038322   .0019004    -2.02   0.044     -.007557   -.0001074
                  2004   |  -.0048258   .0023034    -2.10   0.036    -.0093405   -.0003111
                  2005   |   -.005195   .0027924    -1.86   0.063    -.0106681    .000278
                  2006   |  -.0073117    .002878    -2.54   0.011    -.0129525   -.0016709
                  2007   |  -.0042249   .0031683    -1.33   0.182    -.0104347    .0019848
                  2008   |  -.0050019   .0032002    -1.56   0.118    -.0112742    .0012704
                  2009   |   .0014832    .003818     0.39   0.698    -.0059998    .0089663
                  2010   |   .0088685   .0048462     1.83   0.067    -.0006299     .018367
                         |
            cntyfyurate |  -.0037113   .0002915   -12.73   0.000    -.0042827     -.00314
------------------------------------------------------------------------------------------
Note: dy/dx for factor levels is the discrete change from the base level.


. test 2003.fiscal_year 2004.fiscal_year 2005.fiscal_year 2006.fiscal_year 2007.fiscal_year
> 2008.fiscal_year 2009.fiscal_year 2010.fiscal_year

 ( 1)  [take_up]2003.fiscal_year = 0
 ( 2)  [take_up]2004.fiscal_year = 0
 ( 3)  [take_up]2005.fiscal_year = 0
 ( 4)  [take_up]2006.fiscal_year = 0
 ( 5)  [take_up]2007.fiscal_year = 0
 ( 6)  [take_up]2008.fiscal_year = 0
 ( 7)  [take_up]2009.fiscal_year = 0
 ( 8)  [take_up]2010.fiscal_year = 0

           chi2(  8) =   73.96
         Prob > chi2 =    0.0000

. test 2.race_abrg 3.race_abrg 4.race_abrg

 ( 1)  [take_up]2.race_abrg = 0
 ( 2)  [take_up]3.race_abrg = 0
 ( 3)  [take_up]4.race_abrg = 0

           chi2(  3) =    2.61
```

```
        Prob > chi2 =    0.4560
```

IV.5 VARIANT OF REGRESSION IV.2 WITH INVTIME (= 1/TIME) INSTEAD OF LNTIME

*****POOLED REGRESSION WITH invtime FOR INDIVDUALS' HAZARD TREND AND FYTIME AND FYTIMESQ****

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_prior_fy i
> np_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender clst_prov_dist i.region i.pos_
> mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy invtime  i.cohort_pooled c.fytime##c.fytime
> cntyfyurate, vce(cluster maskid)

Iteration 0:   log pseudolikelihood = -12525.477
Iteration 1:   log pseudolikelihood = -12524.719
Iteration 2:   log pseudolikelihood = -12524.718
Iteration 3:   log pseudolikelihood = -12524.718

Complementary log-log regression                Number of obs     =    170,202
                                                Zero outcomes     =    167,610
                                                Nonzero outcomes  =      2,592

                                                Wald chi2(28)     =    1698.38
Log pseudolikelihood = -12524.718               Prob > chi2       =     0.0000

                                      (Std. Err. adjusted for 26,361 clusters in maskid)
------------------------------------------------------------------------------------------
                         |               Robust
                take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------------+----------------------------------------------------------------
prior_yr_scaled_all_ern~f |   .0204007   .0034002     6.00   0.000     .0137364     .027065
     1.ltc_dummy_prior_fy |  -1.236876   .3108766    -3.98   0.000    -1.846183   -.6275694
    inp_sud_days_prior_fy |  -.0045818   .0092559    -0.50   0.621     -.022723    .0135595
inp_somatic_days_prior_fy |  -.0392749   .0103522    -3.79   0.000    -.0595648   -.0189851
    inp_smh_days_prior_fy |   .0055511   .0026915     2.06   0.039     .0002758    .0108264
                      age |  -.0316574    .001928   -16.42   0.000    -.0354362   -.0278787
                          |
                   gender |
                   Female |  -.4020486   .0422778    -9.51   0.000    -.4849115   -.3191856
            clst_prov_dist |  -.0626369   .0063512    -9.86   0.000     -.075085   -.0501887
                          |
                   region |
         Western Maryland |   .3923751   .0816034     4.81   0.000     .2324355    .5523148
               DC Suburbs |  -.0482094   .0541834    -0.89   0.374     -.154407    .0579882
       Southern Maryland  |   .0403801   .0981955     0.41   0.681    -.1520797    .2328398
     Upper Eastern Shore  |   .5410465   .1124454     4.81   0.000     .3206575    .7614355
    Middle Eastern Shore  |   .4873836   .1386209     3.52   0.000     .2156916    .7590756
     Lower Eastern Shore  |    .065163   .1263794     0.52   0.606     -.182536    .3128621
                          |
   pos_mcare_mos_prior_fy |
           Some Medicare  |   .2342025   .0445243     5.26   0.000     .1469366    .3214685
                          |
                race_abrg |
                   Black  |   .0003499   .0451199     0.01   0.994    -.0880836    .0887833
                Hispanic  |  -.0439147   .1778784    -0.25   0.805      -.39255    .3047206
                   Other  |  -.1552897   .1053493    -1.47   0.140    -.3617705    .0511911
                          |
             mdg_prior_fy |
        Major Depression  |  -.7487533   .0627201   -11.94   0.000    -.8716825   -.6258241
       Bi-Polar Disorder  |  -.3253536   .0571833    -5.69   0.000    -.4374308   -.2132765
    Delusional Psychosis  |  -.9029007   .0880825   -10.25   0.000    -1.075539   -.7302622
Schizotypal Borderline..  |  -.5117025   .2666555    -1.92   0.055    -1.034338    .0109327
                          |
                  invtime |   .6432643   .1747431     3.68   0.000     .3007741    .9857545
                          |
            cohort_pooled |
             2003 Cohort  |  -.1763472   .0632337    -2.79   0.005    -.3002831   -.0524113
             2004 Cohort  |  -.2290431   .0808995    -2.83   0.005    -.3876032    -.070483
                          |
                  fytime |  -.3228224   .0749454    -4.31   0.000    -.4697127   -.1759321
```

```
                           |
        c.fytime#c.fytime |   .0356335   .0062372     5.71   0.000     .0234088    .0478583
                           |
              cntyfyurate |  -.2321815   .0167158   -13.89   0.000    -.2649438   -.1994191
                    _cons |  -.7215238   .2785234    -2.59   0.010     -1.26742    -.175628
------------------------------------------------------------------------------------------

.
. margins, dydx(*) noestimcheck

Average marginal effects                        Number of obs     =    170,202
Model VCE    : Robust

Expression   : Pr(take_up), predict()
dy/dx w.r.t. : prior_yr_scaled_all_erngs_def 1.ltc_dummy_prior_fy inp_sud_days_prior_fy
               inp_somatic_days_prior_fy inp_smh_days_prior_fy age 1.gender clst_prov_dist
               2.region 3.region 4.region 5.region 6.region 7.region
               1.pos_mcare_mos_prior_fy 2.race_abrg 3.race_abrg 4.race_abrg 2.mdg_prior_fy
               3.mdg_prior_fy 4.mdg_prior_fy 5.mdg_prior_fy invtime 1.cohort_pooled
               2.cohort_pooled fytime cntyfyurate

------------------------------------------------------------------------------------------
                           |            Delta-method
                           |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
---------------------------+--------------------------------------------------------------
prior_yr_scaled_all_ern~f |   .0003061   .0000515     5.94   0.000     .0002052     .000407
     1.ltc_dummy_prior_fy |  -.0108619   .0014238    -7.63   0.000    -.0136526   -.0080713
    inp_sud_days_prior_fy |  -.0000687   .0001389    -0.49   0.621     -.000341    .0002035
inp_somatic_days_prior_fy |  -.0005893   .0001557    -3.79   0.000    -.0008944   -.0002842
    inp_smh_days_prior_fy |   .0000833   .0000404     2.06   0.039     4.08e-06    .0001625
                      age |   -.000475   .0000302   -15.74   0.000    -.0005341   -.0004158
                          |
                   gender |
                   Female |  -.0060318    .000639    -9.44   0.000    -.0072843   -.0047793
            clst_prov_dist |  -.0009398   .0000967    -9.72   0.000    -.0011292   -.0007504
                          |
                   region |
         Western Maryland |   .0069089   .0016822     4.11   0.000     .0036118    .0102059
                DC Suburbs |  -.0006818   .0007598    -0.90   0.370     -.002171    .0008074
          Southern Maryland |   .0005962   .0014727     0.40   0.686    -.0022903    .0034826
       Upper Eastern Shore |   .0102869    .002683     3.83   0.000     .0050284    .0155454
      Middle Eastern Shore |    .009012   .0031656     2.85   0.004     .0028075    .0152164
       Lower Eastern Shore |   .0009738   .0019434     0.50   0.616    -.0028352    .0047828
                          |
     pos_mcare_mos_prior_fy |
             Some Medicare |     .00365    .000722     5.06   0.000      .002235    .0050651
                          |
                 race_abrg |
                    Black |   5.29e-06   .0006817     0.01   0.994    -.0013309    .0013415
                 Hispanic |  -.0006495   .0025786    -0.25   0.801    -.0057034    .0044045
                    Other |  -.0021775   .0013882    -1.57   0.117    -.0048983    .0005433
                          |
              mdg_prior_fy |
          Major Depression |  -.0104392   .0007754   -13.46   0.000    -.0119589   -.0089195
         Bi-Polar Disorder |  -.0054774   .0009095    -6.02   0.000    -.0072599   -.0036949
      Delusional Psychosis |  -.0117912    .000863   -13.66   0.000    -.0134827   -.0100996
Schizotypal Borderline..  |   -.007916   .0032137    -2.46   0.014    -.0142146   -.0016173
                          |
                  invtime |   .0096515   .0026276     3.67   0.000     .0045016    .0148015
                          |
             cohort_pooled |
              2003 Cohort |  -.0025876    .000894    -2.89   0.004    -.0043397   -.0008354
              2004 Cohort |  -.0032785   .0010893    -3.01   0.003    -.0054135   -.0011435
                          |
                   fytime |  -.0004899   .0004376    -1.12   0.263    -.0013476    .0003678
               cntyfyurate |  -.0034836   .0002584   -13.48   0.000    -.0039901   -.0029772
------------------------------------------------------------------------------------------
Note: dy/dx for factor levels is the discrete change from the base level.

. test 2.race_abrg 3.race_abrg 4.race_abrg
```

```
 ( 1)  [take_up]2.race_abrg = 0
 ( 2)  [take_up]3.race_abrg = 0
 ( 3)  [take_up]4.race_abrg = 0

           chi2(  3) =    2.32
         Prob > chi2 =    0.5092


. test fytime fytimesq

 ( 1)  [take_up]fytime = 0
 ( 2)  [take_up]fytimesq = 0

           chi2(  2) =   63.14
         Prob > chi2 =    0.0000
```

IV.6 POOLED REGRESSION WITH invtime FOR INDIVDUALS' HAZARD TREND AND FYTIME BUT NOT FYTIMESQ

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_prior_fy i
> np_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender clst_prov_dist i.region i.pos_
> mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy invtime  i.cohort_pooled fytime cntyfyurate,
>  vce(cluster maskid)

Iteration 0:   log pseudolikelihood = -12541.696
Iteration 1:   log pseudolikelihood = -12541.075
Iteration 2:   log pseudolikelihood = -12541.074

Complementary log-log regression                Number of obs     =    170,202
                                                Zero outcomes     =    167,610
                                                Nonzero outcomes  =      2,592

                                                Wald chi2(27)     =    1596.62
Log pseudolikelihood = -12541.074               Prob > chi2       =     0.0000

                                      (Std. Err. adjusted for 26,361 clusters in maskid)
------------------------------------------------------------------------------------------
                         |               Robust
                 take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------------+----------------------------------------------------------------
prior_yr_scaled_all_ern~f |   .0203358   .0034419     5.91   0.000     .0135899    .0270818
     1.ltc_dummy_prior_fy |  -1.233206     .31097    -3.97   0.000    -1.842696   -.6237165
    inp_sud_days_prior_fy |  -.0047964   .0095342    -0.50   0.615     -.023483    .0138903
inp_somatic_days_prior_fy |  -.0393724   .0103545    -3.80   0.000    -.0596669   -.0190779
    inp_smh_days_prior_fy |   .0053923   .0027151     1.99   0.047     .0000708    .0107138
                      age |   -.032093   .0019265   -16.66   0.000     -.035869   -.0283171
                          |
                   gender |
                   Female |  -.4004211   .0422382    -9.48   0.000    -.4832065   -.3176358
            clst_prov_dist |  -.0616393   .0062882    -9.80   0.000    -.0739639   -.0493147
                          |
                   region |
        Western Maryland  |   .3784451   .0817549     4.63   0.000     .2182085    .5386818
              DC Suburbs  |   .0093595   .0542899     0.17   0.863    -.0970468    .1157658
       Southern Maryland  |   .1045713   .0986551     1.06   0.289    -.0887892    .2979318
     Upper Eastern Shore  |   .5624677   .1129081     4.98   0.000      .341172    .7837635
    Middle Eastern Shore  |   .4822058   .1385737     3.48   0.001     .2106064    .7538053
     Lower Eastern Shore  |   .0680911   .1265642     0.54   0.591    -.1799702    .3161524
                          |
   pos_mcare_mos_prior_fy |
           Some Medicare  |     .24292    .044491     5.46   0.000     .1557193    .3301208
                          |
                race_abrg |
                   Black  |  -.0337064   .0451265    -0.75   0.455    -.1221527    .0547399
                Hispanic  |  -.0468915   .1781815    -0.26   0.792    -.3961208    .3023378
                   Other  |  -.1580059   .1053349    -1.50   0.134    -.3644586    .0484468
                          |
             mdg_prior_fy |
        Major Depression  |  -.7497561   .0626987   -11.96   0.000    -.8726432    -.626869
```

```
       Bi-Polar Disorder  |  -.3218113   .0571256    -5.63   0.000    -.4337755   -.2098472
    Delusional Psychosis  |  -.8983594    .088045   -10.20   0.000    -1.070924   -.7257944
Schizotypal Borderline..  |  -.5245513     .26613    -1.97   0.049    -1.046156   -.0029461
                          |
                  invtime |   1.388236   .1160298    11.96   0.000     1.160821     1.61565
                          |
            cohort_pooled |
             2003 Cohort  |  -.3284797   .0568836    -5.77   0.000    -.4399696   -.2169899
             2004 Cohort  |   -.494371   .0678678    -7.28   0.000    -.6273895   -.3613524
                          |
                   fytime |   .0928173   .0175094     5.30   0.000     .0584996     .127135
               cntyfyurate |  -.1946033   .0155586   -12.51   0.000    -.2250976   -.1641091
                     _cons |  -2.078356   .1490233   -13.95   0.000    -2.370436   -1.786276
------------------------------------------------------------------------------------------

. margins, dydx(*) noestimcheck

Average marginal effects                        Number of obs     =    170,202
Model VCE    : Robust

Expression   : Pr(take_up), predict()
dy/dx w.r.t. : prior_yr_scaled_all_erngs_def 1.ltc_dummy_prior_fy inp_sud_days_prior_fy
               inp_somatic_days_prior_fy inp_smh_days_prior_fy age 1.gender clst_prov_dist
               2.region 3.region 4.region 5.region 6.region 7.region
               1.pos_mcare_mos_prior_fy 2.race_abrg 3.race_abrg 4.race_abrg 2.mdg_prior_fy
               3.mdg_prior_fy 4.mdg_prior_fy 5.mdg_prior_fy invtime 1.cohort_pooled
               2.cohort_pooled fytime cntyfyurate

------------------------------------------------------------------------------------------
                          |            Delta-method
                          |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------------+---------------------------------------------------------------
prior_yr_scaled_all_ern~f |   .0003052   .0000521     5.85   0.000      .000203    .0004074
     1.ltc_dummy_prior_fy |  -.0108466   .0014291    -7.59   0.000    -.0136476   -.0080457
    inp_sud_days_prior_fy |   -.000072   .0001431    -0.50   0.615    -.0003525    .0002085
inp_somatic_days_prior_fy |   -.000591   .0001558    -3.79   0.000    -.0008963   -.0002857
    inp_smh_days_prior_fy |   .0000809   .0000408     1.98   0.047     1.01e-06    .0001609
                      age |  -.0004817   .0000302   -15.95   0.000    -.0005409   -.0004225
                          |
                   gender |
                   Female |  -.0060086   .0006384    -9.41   0.000      -.00726   -.0047573
            clst_prov_dist |  -.0009252   .0000957    -9.67   0.000    -.0011128   -.0007376
                          |
                   region |
         Western Maryland |   .0065062   .0016353     3.98   0.000     .0033011    .0097113
                DC Suburbs |   .0001338   .0007775     0.17   0.863    -.0013901    .0016577
        Southern Maryland |   .0015665   .0015394     1.02   0.309    -.0014507    .0045837
      Upper Eastern Shore |   .0106363   .0027038     3.93   0.000      .005337    .0159357
     Middle Eastern Shore |   .0087453   .0030978     2.82   0.005     .0026737    .0148168
      Lower Eastern Shore |   .0010018   .0019187     0.52   0.602    -.0027588    .0047625
                          |
   pos_mcare_mos_prior_fy |
            Some Medicare |   .0037937   .0007242     5.24   0.000     .0023742    .0052132
                          |
                race_abrg |
                   Black  |  -.0005087   .0006807    -0.75   0.455    -.0018429    .0008255
                Hispanic  |  -.0007032   .0026156    -0.27   0.788    -.0058297    .0044233
                   Other  |  -.0022469   .0014062    -1.60   0.110    -.0050029    .0005091
                          |
             mdg_prior_fy |
          Major Depression |  -.0104418   .0007741   -13.49   0.000    -.0119591   -.0089246
        Bi-Polar Disorder  |  -.0054235   .0009099    -5.96   0.000    -.0072069     -.00364
    Delusional Psychosis  |  -.0117463   .0008645   -13.59   0.000    -.0134408   -.0100518
Schizotypal Borderline..  |  -.0080633   .0031663    -2.55   0.011    -.0142691   -.0018574
                          |
                  invtime |   .0208368   .0017796    11.71   0.000     .0173489    .0243247
                          |
            cohort_pooled |
             2003 Cohort  |  -.0048251    .000777    -6.21   0.000     -.006348   -.0033022
             2004 Cohort  |   -.006734   .0008158    -8.25   0.000     -.008333    -.005135
                          |
```

```
                fytime |   .0013931   .0002639     5.28   0.000      .000876    .0019103
            cntyfyurate |  -.0029209   .0002393   -12.21   0.000      -.00339   -.0024519
------------------------------------------------------------------------------------------
Note: dy/dx for factor levels is the discrete change from the base level.

. test 2.race_abrg 3.race_abrg 4.race_abrg

 ( 1)  [take_up]2.race_abrg = 0
 ( 2)  [take_up]3.race_abrg = 0
 ( 3)  [take_up]4.race_abrg = 0

           chi2(  3) =    2.44
         Prob > chi2 =    0.4859
```

IV.7 RANDOM EFFECTS REGRESSION MODEL 1 AS IN IV.1 ABOVE

```
. xtset (maskid)
       panel variable:  maskid (unbalanced)
. xtcloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_p
> rior_fy inp_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender clst_prov_dist
>  i.region i.pos_mcare_mos_prior_fy lntime i.race_abrg i.mdg_prior_fy  i.cohort_pool
> ed i.b2002.fiscal_year cntyfyurate

Fitting comparison model:

Iteration 0:   log likelihood = -12518.764
Iteration 1:   log likelihood = -12518.011
Iteration 2:   log likelihood = -12518.009
Iteration 3:   log likelihood = -12518.009

Fitting full model:

tau =  0.0     log likelihood = -12518.009
tau =  0.1     log likelihood = -12521.021

Iteration 0:   log likelihood = -12521.021
Iteration 1:   log likelihood = -12518.211
Iteration 2:   log likelihood = -12518.143
Iteration 3:   log likelihood = -12518.024  (not concave)
Iteration 4:   log likelihood = -12518.016
Iteration 5:   log likelihood = -12518.013
Iteration 6:   log likelihood = -12518.013

Random-effects complementary log-log model      Number of obs     =    170,202
Group variable: maskid                          Number of groups  =     26,361

Random effects u_i ~ Gaussian                   Obs per group:
                                                              min =          1
                                                              avg =        6.5
                                                              max =          9

Integration method: mvaghermite                 Integration pts.  =         12

                                                Wald chi2(34)     =    1723.57
Log likelihood  = -12518.013                    Prob > chi2       =     0.0000

------------------------------------------------------------------------------
           take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------+----------------------------------------------------------------
prior_yr_scaled_~f |     .02043   .0026459     7.72   0.000     .0152442    .0256158
1.ltc_dummy_prio~y |  -1.237083   .3184699    -3.88   0.000    -1.861273   -.6128939
inp_sud_days_pri~y |  -.0043864   .0124081    -0.35   0.724    -.0287059     .019933
inp_somatic_d~r_fy |  -.0391403   .0085609    -4.57   0.000    -.0559194   -.0223612
```

```
inp_smh_days_pri~y |    .005653   .0030655     1.84   0.065    -.0003553    .0116613
               age |   -.031534    .001974   -15.97   0.000     -.035403    -.027665
                   |
            gender |
            Female |  -.4026246   .0417676    -9.64   0.000    -.4844876   -.3207616
     clst_prov_dist |   -.063126   .0057548   -10.97   0.000    -.0744052   -.0518468
                   |
            region |
 Western Maryland  |   .3979531    .082811     4.81   0.000     .2356465    .5602598
       DC Suburbs  |  -.0723283   .0556649    -1.30   0.194    -.1814295    .0367728
Southern Maryland  |   .0144021   .1011795     0.14   0.887    -.1839062    .2127103
Upper Eastern S..  |     .53211   .1110644     4.79   0.000     .3144279    .7497922
Middle Eastern ..  |   .4885401   .1382033     3.53   0.000     .2176667    .7594136
Lower Eastern S..  |    .062562   .1257896     0.50   0.619    -.1839811    .3091052
                   |
pos_mcare_mos_pr~y |
    Some Medicare  |   .2314065   .0438974     5.27   0.000     .1453693    .3174438
            lntime |  -.6473539   .1626238    -3.98   0.000    -.9660906   -.3286172
                   |
         race_abrg |
            Black  |   .0151711   .0460882     0.33   0.742    -.0751602    .1055023
         Hispanic  |  -.0434126   .1806757    -0.24   0.810    -.3975304    .3107052
            Other  |  -.1537134   .1038767    -1.48   0.139     -.357308    .0498812
                   |
      mdg_prior_fy |
 Major Depression  |  -.7485818   .0617802   -12.12   0.000    -.8696686   -.6274949
Bi-Polar Disorder  |  -.3268955   .0553817    -5.90   0.000    -.4354415   -.2183494
Delusional Psyc..  |  -.9043198   .0881573   -10.26   0.000    -1.077105   -.7315347
Schizotypal Bor..  |  -.5069222   .2696065    -1.88   0.060    -1.035341    .0214968
                   |
     cohort_pooled |
      2003 Cohort  |  -.2888109   .0807896    -3.57   0.000    -.4471556   -.1304662
      2004 Cohort  |  -.4761503   .1235225    -3.85   0.000    -.7182499   -.2340508
                   |
       fiscal_year |
             2003  |  -.1257971   .1180586    -1.07   0.287    -.3571876    .1055935
             2004  |  -.0643877   .1730073    -0.37   0.710    -.4034759    .2747004
             2005  |   .0385665   .2384505     0.16   0.872    -.4287878    .5059208
             2006  |  -.0116884   .2823446    -0.04   0.967    -.5650737    .5416968
             2007  |   .3361764   .3135297     1.07   0.284    -.2783304    .9506833
             2008  |   .3702608   .3410545     1.09   0.278    -.2981937    1.038715
             2009  |   .8444512   .3661424     2.31   0.021     .1268252    1.562077
             2010  |   1.234663    .390711     3.16   0.002     .4688838    2.000443
                   |
      cntyfyurate  |  -.2473527   .0180702   -13.69   0.000    -.2827697   -.2119357
            _cons  |  -.2933404    .129728    -2.26   0.024    -.5476025   -.0390783
-------------------+------------------------------------------------------------------
         /lnsig2u  |  -5.899802   3.094938                     -11.96577    .1661648
-------------------+------------------------------------------------------------------
           sigma_u |   .0523449   .0810021                      .0025215    1.086631
               rho |   .0016629   .0051381                      3.87e-06     .417867
------------------------------------------------------------------------------------
LR test of rho=0: chibar2(01) = 0.01                  Prob >= chibar2 = 0.466
```

IV.8 ALTERNATIVE ESTIMATED MARGINAL EFFECTS OF FYTIME FOR REGRESSION IN IV.2 ABOVE

```
. margins if fytime>4, dydx(fytime) noestimcheck

Average marginal effects                        Number of obs     =     89,752
Model VCE    : Robust

Expression   : Pr(take_up), predict()
```

```
dy/dx w.r.t. : fytime
---------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      fytime |    .002916   .0004021     7.25   0.000      .002128    .0037041
------------------------------------------------------------------------------

. margins if fytime>5, dydx(fytime) noestimcheck

Average marginal effects                        Number of obs     =     69,920
Model VCE    : Robust

Expression   : Pr(take_up), predict()
dy/dx w.r.t. : fytime

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      fytime |   .0032591   .0004116     7.92   0.000     .0024524    .0040657
------------------------------------------------------------------------------

. margins if fytime<5, dydx(fytime) noestimcheck

Average marginal effects                        Number of obs     =     80,450
Model VCE    : Robust

Expression   : Pr(take_up), predict()
dy/dx w.r.t. : fytime

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      fytime |  -.0005365   .0014064    -0.38   0.703     -.003293    .0022199
------------------------------------------------------------------------------
```

IV.9 ALTERNATIVE ESTIMATED MARGINAL EFFECTS OF FYTIME FOR REGRESSION IN IV.5 ABOVE

```
. margins if fytime>4, dydx(fytime) noestimcheck

Average marginal effects                        Number of obs     =     89,752
Model VCE    : Robust

Expression   : Pr(take_up), predict()
dy/dx w.r.t. : fytime

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      fytime |   .0018217    .000278     6.55   0.000     .0012769    .0023665
------------------------------------------------------------------------------

. margins if fytime<5, dydx(fytime) noestimcheck

Average marginal effects                        Number of obs     =     80,450
Model VCE    : Robust

Expression   : Pr(take_up), predict()
dy/dx w.r.t. : fytime

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
```

```
-------------+----------------------------------------------------------------
      fytime |  -.0030688   .0009264    -3.31   0.001    -.0048845   -.0012531
------------------------------------------------------------------------------

. margins if fytime>5, dydx(fytime) noestimcheck

Average marginal effects                        Number of obs     =     69,920
Model VCE    : Robust

Expression   : Pr(take_up), predict()
dy/dx w.r.t. : fytime

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      fytime |   .0022242   .0003334     6.67   0.000     .0015708    .0028776
------------------------------------------------------------------------------
```

V. COHORT-SPECIFIC REGRESSIONS

V.1 REGRESSIONS WITH FY DUMMIES

*****COHORT 1 (FY2002) CLOGLOG TAKE UP REGRESSION WITH FY DUMMIES**********

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_p
> rior_fy inp_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender clst_prov_di
> st i.region i.pos_mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy  i.cohort_pooled
> ib2002.fiscal_year cntyfyurate if cohort_pooled==0, vce(cluster maskid)
note: 0.cohort_pooled omitted because of collinearity

Iteration 0:   log pseudolikelihood = -8587.4449
Iteration 1:   log pseudolikelihood = -8586.7894
Iteration 2:   log pseudolikelihood = -8586.7851
Iteration 3:   log pseudolikelihood = -8586.7851

Complementary log-log regression                Number of obs     =    105,880
                                                Zero outcomes     =    104,057
                                                Nonzero outcomes  =      1,823

                                                Wald chi2(31)     =    1219.42
Log pseudolikelihood = -8586.7851               Prob > chi2       =     0.0000

                                (Std. Err. adjusted for 15,100 clusters in maskid)
------------------------------------------------------------------------------
                 |               Robust
         take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------+------------------------------------------------------------
prior_yr_scale~f |   .0209406   .0045883     4.56   0.000     .0119477    .0299335
1.ltc_dummy_pr~y |  -1.010697   .3485071    -2.90   0.004    -1.693758   -.3276359
inp_sud_days_p~y |   .0156334   .0100613     1.55   0.120    -.0040864    .0353531
inp_somatic~r_fy |  -.0263453   .0095055    -2.77   0.006    -.0449758   -.0077148
inp_smh_days_p~y |   .0035065   .0031259     1.12   0.262    -.0026202    .0096332
             age |  -.0350203     .00234   -14.97   0.000    -.0396066    -.030434
                 |
          gender |
          Female |  -.3617589   .0506623    -7.14   0.000    -.4610552   -.2624625
  clst_prov_dist |  -.0736536   .0080781    -9.12   0.000    -.0894863   -.0578208
                 |
          region |
Western Maryl..  |    .441995   .0976403     4.53   0.000     .2506235    .6333665
     DC Suburbs  |  -.0170524   .0660491    -0.26   0.796    -.1465063    .1124015
Southern Mary..  |   .0758846   .1199101     0.63   0.527     -.159135    .3109041
```

```
Upper Eastern..  |   .6165265   .1305413     4.72   0.000     .3606702    .8723827
Middle Easter..  |   .3916209   .1753767     2.23   0.026     .0478888    .7353529
Lower Eastern..  |   .0237529   .1561902     0.15   0.879    -.2823742    .3298801
                 |
pos_mcare_mos_~y |
  Some Medicare  |   .2403624   .0512398     4.69   0.000     .1399343    .3407906
                 |
       race_abrg |
          Black  |   .0020008   .0545793     0.04   0.971    -.1049726    .1089742
       Hispanic  |   .0254381   .2004291     0.13   0.899    -.3673957    .4182719
          Other  |  -.1972844   .1305643    -1.51   0.131    -.4531857    .0586169
                 |
    mdg_prior_fy |
Major Depress..  |  -.7548676   .0816708    -9.24   0.000    -.9149394   -.5947959
Bi-Polar Diso..  |   -.309339   .0703864    -4.39   0.000    -.4472939   -.1713841
Delusional Ps..  |  -.9017072   .1081058    -8.34   0.000    -1.113591   -.6898238
Schizotypal B..  |  -.3694353   .3134135    -1.18   0.238    -.9837146     .244844
                 |
   cohort_pooled |
    2002 Cohort  |          0  (omitted)
                 |
     fiscal_year |
           2003  |  -.5334031   .0742773    -7.18   0.000    -.6789839   -.3878223
           2004  |  -.8637811   .0872037    -9.91   0.000    -1.034697   -.6928649
           2005  |  -.8704023   .0901933    -9.65   0.000    -1.047178   -.6936266
           2006  |  -1.012241   .0966968   -10.47   0.000    -1.201764   -.8227192
           2007  |  -.7407617   .0897943    -8.25   0.000    -.9167553    -.564768
           2008  |  -.8119454   .0944816    -8.59   0.000     -.997126   -.6267649
           2009  |  -.5471766   .1124069    -4.87   0.000      -.76749   -.3268631
           2010  |  -.1977341   .1315264    -1.50   0.133    -.4555211    .0600528
                 |
     cntyfyurate |  -.2315661   .0228122   -10.15   0.000    -.2762771   -.1868551
           _cons |  -.2473068   .1553413    -1.59   0.111    -.5517702    .0571566
-------------------------------------------------------------------------------
```

*******COHORT 2 (FY2003) CLOGLOG TAKE UP REGRESSION WITH FY DUMMIES**********

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_p
> rior_fy inp_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender clst_prov_di
> st i.region i.pos_mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy  i.cohort_pooled
> ib2002.fiscal_year cntyfyurate if cohort_pooled==1, vce(cluster maskid)
note: 1.cohort_pooled omitted because of collinearity
note: 2002.fiscal_year identifies no observations in the sample
note: 2010.fiscal_year omitted because of collinearity
note: 2002.fiscal_year identifies no observations in the sample

Iteration 0:   log pseudolikelihood = -2189.4593
Iteration 1:   log pseudolikelihood = -2189.2439
Iteration 2:   log pseudolikelihood = -2189.2424
Iteration 3:   log pseudolikelihood = -2189.2424

Complementary log-log regression                Number of obs     =     35,378
                                                Zero outcomes     =     34,945
                                                Nonzero outcomes  =        433

                                                Wald chi2(30)     =     279.32
Log pseudolikelihood = -2189.2424               Prob > chi2       =     0.0000

                                 (Std. Err. adjusted for 5,878 clusters in maskid)
-------------------------------------------------------------------------------
                 |               Robust
         take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------+-------------------------------------------------------------
```

```
prior_yr_scale~f |   .0267217   .0072786     3.67   0.000     .0124559    .0409875
1.ltc_dummy_pr~y |  -1.288653   .6768694    -1.90   0.057    -2.615293    .0379866
inp_sud_days_p~y |  -.1304263   .1200773    -1.09   0.277    -.3657734    .1049209
inp_somatic~r_fy |  -.0867931   .0558371    -1.55   0.120    -.1962318    .0226456
inp_smh_days_p~y |   .0174168   .0082589     2.11   0.035     .0012296     .033604
             age |  -.0294903   .0047316    -6.23   0.000    -.0387641   -.0202166
                 |
          gender |
         Female  |  -.4731964   .1023789    -4.62   0.000    -.6738554   -.2725374
  clst_prov_dist |  -.0389355   .0144377    -2.70   0.007    -.0672329   -.0106381
                 |
          region |
Western Maryl..  |   .1361346   .2092717     0.65   0.515    -.2740303    .5462995
     DC Suburbs  |   -.312877   .1504915    -2.08   0.038    -.6078349   -.0179191
Southern Mary..  |  -.2854945   .2556478    -1.12   0.264    -.7865549    .2155659
Upper Eastern..  |   .6080473   .2668461     2.28   0.023     .0850386    1.131056
Middle Easter..  |   .5859586   .3139558     1.87   0.062    -.0293835    1.201301
Lower Eastern..  |   .1425579   .2761498     0.52   0.606    -.3986857    .6838016
                 |
pos_mcare_mos_~y |
  Some Medicare  |   .2991889   .1178684     2.54   0.011     .0681712    .5302066
                 |
       race_abrg |
          Black  |   .0385441   .1181997     0.33   0.744    -.1931231    .2702113
       Hispanic  |  -.0910885     .59696    -0.15   0.879    -1.261109    1.078932
          Other  |   .0317758   .2307729     0.14   0.890    -.4205307    .4840823
                 |
    mdg_prior_fy |
Major Depress..  |  -.7082098   .1345793    -5.26   0.000    -.9719805   -.4444392
Bi-Polar Diso..  |  -.3915679   .1296866    -3.02   0.003    -.6457489   -.1373869
Delusional Ps..  |  -.9148102   .2059036    -4.44   0.000    -1.318374   -.5112466
Schizotypal B..  |  -1.609613   1.011425    -1.59   0.112    -3.591969    .3727429
                 |
   cohort_pooled |
    2003 Cohort  |          0  (omitted)
                 |
     fiscal_year |
           2002  |          0  (empty)
           2003  |    .076172   .2757548     0.28   0.782    -.4642975    .6166416
           2004  |   .0263201   .2773432     0.09   0.924    -.5172626    .5699029
           2005  |  -.6106673   .3002347    -2.03   0.042    -1.199116   -.0222182
           2006  |  -.4685624   .3090564    -1.52   0.129    -1.074302     .137177
           2007  |  -.4397443   .3144113    -1.40   0.162    -1.055979    .1764904
           2008  |  -.5842412   .3257016    -1.79   0.073    -1.222605    .0541222
           2009  |  -.1381257   .2837171    -0.49   0.626    -.6942011    .4179496
           2010  |          0  (omitted)
                 |
     cntyfyurate |  -.2239927   .0456246    -4.91   0.000    -.3134152   -.1345701
           _cons |  -1.071557   .4890761    -2.19   0.028    -2.030129   -.1129859
------------------------------------------------------------------------------
```

*******COHORT 3 (FY2004) CLOGLOG TAKE UP REGRESSION WITH FY DUMMIES**********

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_p
> rior_fy inp_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender clst_prov_di
> st i.region i.pos_mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy ib2002.fiscal_yea
> r cntyfyurate if cohort_pooled==2, vce(cluster maskid)
note: 2002.fiscal_year identifies no observations in the sample
note: 2010.fiscal_year omitted because of collinearity
note: 0.ltc_dummy_prior_fy != 1 predicts failure perfectly
      0.ltc_dummy_prior_fy dropped and 710 obs not used
```

```
note: 1.ltc_dummy_prior_fy omitted because of collinearity
note: 2002.fiscal_year identifies no observations in the sample

Iteration 0:   log pseudolikelihood = -1698.7392
Iteration 1:   log pseudolikelihood =  -1698.618
Iteration 2:   log pseudolikelihood = -1698.6178

Complementary log-log regression                Number of obs     =     28,234
                                                Zero outcomes     =     27,898
                                                Nonzero outcomes  =        336

                                                Wald chi2(28)     =     251.22
Log pseudolikelihood = -1698.6178               Prob > chi2       =     0.0000

                                (Std. Err. adjusted for 5,247 clusters in maskid)
------------------------------------------------------------------------------
                 |               Robust
        take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------+------------------------------------------------------------------
prior_yr_scale~f |   .0142667   .0059992     2.38   0.017     .0025085     .026025
1.ltc_dummy_pr~y |          0  (empty)
inp_sud_days_p~y |  -.0774345   .1303483    -0.59   0.552    -.3329123    .1780434
inp_somatic~r_fy |  -.0731644    .041091    -1.78   0.075    -.1537012    .0073724
inp_smh_days_p~y |   .0059257   .0106839     0.55   0.579    -.0150144    .0268657
             age |  -.0173219   .0049086    -3.53   0.000    -.0269426   -.0077011
                 |
          gender |
          Female |  -.5010924   .1179971    -4.25   0.000    -.7323625   -.2698224
  clst_prov_dist |  -.0497966   .0144523    -3.45   0.001    -.0781227   -.0214706
                 |
          region |
Western Maryl..  |   .4729548    .218347     2.17   0.030     .0450026     .900907
     DC Suburbs  |   -.114514   .1539333    -0.74   0.457    -.4162178    .1871897
Southern Mary..  |   .0714855   .2495149     0.29   0.774    -.4175548    .5605258
Upper Eastern..  |  -.1799498   .4238861    -0.42   0.671    -1.010751    .6508517
Middle Easter..  |   .7764977   .3335782     2.33   0.020     .1226965    1.430299
Lower Eastern..  |   .1082026   .3364707     0.32   0.748    -.5512679    .7676731
                 |
pos_mcare_mos_~y |
  Some Medicare  |   .0627741   .1424982     0.44   0.660    -.2165172    .3420655
                 |
       race_abrg |
          Black  |   .0474284   .1245593     0.38   0.703    -.1967032    .2915601
       Hispanic  |  -.4275642   .5122184    -0.83   0.404    -1.431494    .5763655
          Other  |  -.2603144   .2849193    -0.91   0.361     -.818746    .2981172
                 |
    mdg_prior_fy |
Major Depress..  |  -.8185321   .1493702    -5.48   0.000    -1.111292    -.525772
Bi-Polar Diso..  |  -.3489201   .1468979    -2.38   0.018    -.6368346   -.0610056
Delusional Ps..  |  -.9444708   .2326797    -4.06   0.000    -1.400515   -.4884269
Schizotypal B..  |  -.2802648   .5880084    -0.48   0.634     -1.43274    .8722105
                 |
     fiscal_year |
            2002 |          0  (empty)
            2004 |    -.42076   .2800429    -1.50   0.133     -.969634     .128114
            2005 |  -.5488765   .2892569    -1.90   0.058     -1.11581    .0180566
            2006 |  -1.366699   .3268593    -4.18   0.000    -2.007332   -.7260668
            2007 |  -1.184612    .318831    -3.72   0.000    -1.809509   -.5597146
            2008 |  -1.214261   .3351994    -3.62   0.000     -1.87124   -.5572824
            2009 |  -.3867163   .2782772    -1.39   0.165    -.9321296    .1586969
            2010 |          0  (omitted)
                 |
     cntyfyurate |  -.3682202   .0519753    -7.08   0.000    -.4700899   -.2663506
```

```
          _cons |   -.249774   .5028844    -0.50   0.619    -1.235409    .7358614
------------------------------------------------------------------------------
```

V.2 REGRESSIONS WITH lntime

*******COHORT 1 (FY2002) CLOGLOG TAKE UP REGRESSION WITH lntime**********

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_p
> rior_fy inp_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender lntime clst_
> prov_dist i.region i.pos_mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy cntyfyurat
> e if cohort_pooled==0, vce(cluster maskid)

Iteration 0:   log pseudolikelihood = -8634.6122
Iteration 1:   log pseudolikelihood = -8633.9206
Iteration 2:   log pseudolikelihood = -8633.9164
Iteration 3:   log pseudolikelihood = -8633.9164

Complementary log-log regression                Number of obs     =    105,880
                                                Zero outcomes     =    104,057
                                                Nonzero outcomes  =      1,823

                                                Wald chi2(24)     =    1003.10
Log pseudolikelihood = -8633.9164               Prob > chi2       =     0.0000

                                (Std. Err. adjusted for 15,100 clusters in maskid)
------------------------------------------------------------------------------
                 |               Robust
         take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------+------------------------------------------------------------------
prior_yr_scale~f |   .0207772   .0046522     4.47   0.000     .0116589    .0298954
1.ltc_dummy_pr~y |  -1.033328   .3482434    -2.97   0.003    -1.715873   -.3507834
inp_sud_days_p~y |   .0156641   .0103469     1.51   0.130    -.0046155    .0359436
inp_somatic~r_fy |  -.0271626   .0096462    -2.82   0.005    -.0460687   -.0082565
inp_smh_days_p~y |   .0032659    .003153     1.04   0.300    -.0029139    .0094458
             age |  -.0342049   .0023206   -14.74   0.000    -.0387532   -.0296566
                 |
          gender |
         Female  |  -.3621761   .0504694    -7.18   0.000    -.4610942    -.263258
          lntime |  -.3661612   .0354977   -10.32   0.000    -.4357354   -.2965869
  clst_prov_dist |  -.0713096   .0079036    -9.02   0.000    -.0868004   -.0558188
                 |
          region |
Western Maryl..  |   .4068388   .0974548     4.17   0.000     .2158309    .5978467
     DC Suburbs  |   .0937394   .0653618     1.43   0.152    -.0343675    .2218462
Southern Mary..  |   .1954185   .1200941     1.63   0.104    -.0399615    .4307986
Upper Eastern..  |    .672065   .1317376     5.10   0.000      .413864     .930266
Middle Easter..  |   .3859425    .175577     2.20   0.028     .0418178    .7300672
Lower Eastern..  |   .0284365   .1558505     0.18   0.855    -.2770248    .3338979
                 |
pos_mcare_mos_~y |
  Some Medicare  |   .2466725   .0509725     4.84   0.000     .1467682    .3465769
                 |
       race_abrg |
          Black  |  -.0625333   .0537214    -1.16   0.244    -.1678253    .0427588
       Hispanic  |   .0281261   .2005661     0.14   0.888    -.3649763    .4212285
          Other  |  -.1954796   .1302287    -1.50   0.133    -.4507232     .059764
                 |
    mdg_prior_fy |
Major Depress..  |    -.75494   .0814803    -9.27   0.000    -.9146385   -.5952414
Bi-Polar Diso..  |  -.2963242   .0700578    -4.23   0.000    -.4336349   -.1590134
Delusional Ps..  |  -.8888033   .1079232    -8.24   0.000    -1.100329   -.6772777
Schizotypal B..  |  -.3915959   .3122632    -1.25   0.210     -1.00362    .2204287
                 |
```

```
     cntyfyurate |  -.1578552    .019821    -7.96   0.000    -.1967037   -.1190068
           _cons |  -.8115524   .1457233    -5.57   0.000    -1.097165     -.52594
------------------------------------------------------------------------------
```

*******COHORT 2 (FY2003) CLOGLOG TAKE UP REGRESSION WITH lntime**********

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_p
> rior_fy inp_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender lntime clst_
> prov_dist i.region i.pos_mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy cntyfyurat
> e if cohort_pooled==1, vce(cluster maskid)
Iteration 0:   log pseudolikelihood = -2197.0506
Iteration 1:   log pseudolikelihood = -2196.8513
Iteration 2:   log pseudolikelihood = -2196.8498
Iteration 3:   log pseudolikelihood = -2196.8498

Complementary log-log regression                Number of obs     =     35,378
                                                Zero outcomes     =     34,945
                                                Nonzero outcomes  =        433

                                                Wald chi2(24)     =     250.47
Log pseudolikelihood = -2196.8498               Prob > chi2       =     0.0000
                                (Std. Err. adjusted for 5,878 clusters in maskid)
------------------------------------------------------------------------------
                |               Robust
        take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------+-------------------------------------------------------------
prior_yr_scale~f |   .0272951   .0072335     3.77   0.000     .0131177    .0414724
1.ltc_dummy_pr~y |  -1.285406   .6751433    -1.90   0.057    -2.608662    .0378507
inp_sud_days_p~y |  -.1334048   .1226173    -1.09   0.277    -.3737304    .1069207
inp_somatic~r_fy |  -.0876235   .0558429    -1.57   0.117    -.1970736    .0218266
inp_smh_days_p~y |   .0172704   .0083199     2.08   0.038     .0009636    .0335771
             age |  -.0297579   .0047358    -6.28   0.000    -.0390399   -.0204758
                 |
          gender |
         Female  |  -.4713903   .1021948    -4.61   0.000    -.6716885   -.2710921
          lntime |  -.2749337   .0734562    -3.74   0.000    -.4189051   -.1309623
  clst_prov_dist |  -.0367479   .0139839    -2.63   0.009    -.0641558     -.00934
                 |
          region |
Western Maryl..  |    .119188   .2091194     0.57   0.569    -.2906785    .5290545
     DC Suburbs  |  -.1976643   .1430384    -1.38   0.167    -.4780144    .0826859
Southern Mary..  |  -.1686193    .255375    -0.66   0.509    -.6691452    .3319065
Upper Eastern..  |   .6238727   .2688462     2.32   0.020     .0969439    1.150801
Middle Easter..  |   .5575248   .3125597     1.78   0.074    -.0550809    1.170131
Lower Eastern..  |   .1269327   .2786827     0.46   0.649    -.4192753    .6731407
                 |
pos_mcare_mos_~y |
  Some Medicare  |   .3077128   .1171613     2.63   0.009     .0780809    .5373447
                 |
       race_abrg |
          Black  |  -.0282792   .1154266    -0.24   0.806    -.2545112    .1979528
       Hispanic  |  -.1137193   .5979421    -0.19   0.849    -1.285664    1.058226
          Other  |   .0175409   .2299052     0.08   0.939    -.4330651    .4681468
                 |
    mdg_prior_fy |
Major Depress..  |  -.7068852   .1343077    -5.26   0.000    -.9701234    -.443647
Bi-Polar Diso..  |  -.3865949   .1290509    -3.00   0.003    -.6395301   -.1336597
Delusional Ps..  |  -.9066148   .2061335    -4.40   0.000    -1.310629   -.5026006
Schizotypal B..  |  -1.622759   1.010842    -1.61   0.108    -3.603974    .3584555
                 |
     cntyfyurate |  -.1557963   .0363272    -4.29   0.000    -.2269963   -.0845963
           _cons |    -1.3559   .2841974    -4.77   0.000    -1.912917   -.7988838
------------------------------------------------------------------------------
```

*******COHORT 3 (FY2004) CLOGLOG TAKE UP REGRESSION WITH lntime**********

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_p
> rior_fy inp_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender lntime clst_
> prov_dist i.region i.pos_mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy cntyfyurat
> e if cohort_pooled==2, vce(cluster maskid)
note: 0.ltc_dummy_prior_fy != 1 predicts failure perfectly
      0.ltc_dummy_prior_fy dropped and 710 obs not used

note: 1.ltc_dummy_prior_fy omitted because of collinearity

Iteration 0:   log pseudolikelihood = -1715.4901
Iteration 1:   log pseudolikelihood = -1715.3885
Iteration 2:   log pseudolikelihood = -1715.3885

Complementary log-log regression                Number of obs     =     28,234
                                                Zero outcomes     =     27,898
                                                Nonzero outcomes  =        336

                                                Wald chi2(23)     =     216.17
Log pseudolikelihood = -1715.3885               Prob > chi2       =     0.0000

                                (Std. Err. adjusted for 5,247 clusters in maskid)
------------------------------------------------------------------------------
                 |               Robust
         take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------+------------------------------------------------------------------
prior_yr_scale~f |   .0147508   .0057339     2.57   0.010     .0035126    .0259891
1.ltc_dummy_pr~y |          0  (empty)
inp_sud_days_p~y |  -.0863012   .1388068    -0.62   0.534    -.3583575    .1857551
inp_somatic~r_fy |  -.0749317    .041817    -1.79   0.073    -.1568916    .0070282
inp_smh_days_p~y |   .0055681   .0107285     0.52   0.604    -.0154595    .0265956
             age |  -.0177799   .0048985    -3.63   0.000    -.0273808    -.008179
                 |
          gender |
         Female  |  -.5000533   .1175913    -4.25   0.000     -.730528   -.2695786
          lntime |  -.2891152   .0873979    -3.31   0.001     -.460412   -.1178185
  clst_prov_dist |   -.045398   .0140027    -3.24   0.001    -.0728427   -.0179533
                 |
          region |
Western Maryl..  |   .4161012   .2189613     1.90   0.057    -.0130551    .8452575
     DC Suburbs  |   .1501305   .1543995     0.97   0.331    -.1524869    .4527479
Southern Mary..  |   .3444111   .2578164     1.34   0.182    -.1608997    .8497219
Upper Eastern..  |   -.138549   .4271965    -0.32   0.746    -.9758388    .6987407
Middle Easter..  |    .724339   .3345448     2.17   0.030     .0686432    1.380035
Lower Eastern..  |   .1143654   .3411447     0.34   0.737    -.5542659    .7829966
                 |
pos_mcare_mos_~y |
  Some Medicare  |   .0797565   .1418882     0.56   0.574    -.1983393    .3578523
                 |
       race_abrg |
          Black  |  -.1010632    .124913    -0.81   0.418    -.3458881    .1437617
       Hispanic  |  -.4601488   .5064784    -0.91   0.364    -1.452828    .5325307
          Other  |  -.2828739   .2848899    -0.99   0.321    -.8412479    .2755001
                 |
    mdg_prior_fy |
Major Depress..  |  -.8197416   .1491174    -5.50   0.000    -1.112006   -.5274769
Bi-Polar Diso..  |  -.3220729    .146793    -2.19   0.028    -.6097819   -.0343639
Delusional Ps..  |  -.9300054   .2320052    -4.01   0.000    -1.384727   -.4752836
Schizotypal B..  |  -.3087093   .5884715    -0.52   0.600    -1.462092    .8446736
                 |
     cntyfyurate |   -.203638   .0410335    -4.96   0.000    -.2840623   -.1232138
           _cons |  -1.532425   .3117186    -4.92   0.000    -2.143382   -.9214678
```

V.3 Rgressions with invtime

*******COHORT 1 (FY2002) CLOGLOG TAKE UP REGRESSION WITH invtime**********

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_p
> rior_fy inp_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender invtime clst
> _prov_dist i.region i.pos_mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy cntyfyura
> te if cohort_pooled==0, vce(cluster maskid)
Iteration 0:   log pseudolikelihood = -8613.0233
Iteration 1:   log pseudolikelihood = -8612.3357
Iteration 2:   log pseudolikelihood = -8612.3315
Iteration 3:   log pseudolikelihood = -8612.3315
Complementary log-log regression                Number of obs     =    105,880
                                                Zero outcomes     =    104,057
                                                Nonzero outcomes  =      1,823

                                                Wald chi2(24)     =    1091.47
Log pseudolikelihood = -8612.3315               Prob > chi2       =     0.0000

                                (Std. Err. adjusted for 15,100 clusters in maskid)
------------------------------------------------------------------------------
                |               Robust
        take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------+-------------------------------------------------------------
prior_yr_scale~f |   .0207539   .0046375     4.48   0.000     .0116645    .0298433
1.ltc_dummy_pr~y |  -1.032467   .3481396    -2.97   0.003    -1.714808   -.3501265
inp_sud_days_p~y |   .0155699   .0102975     1.51   0.131    -.0046128    .0357526
inp_somatic~r_fy |  -.0271519   .0096314    -2.82   0.005    -.0460291   -.0082747
inp_smh_days_p~y |   .0033088    .003139     1.05   0.292    -.0028435     .009461
             age |  -.0338714   .0023014   -14.72   0.000    -.0383821   -.0293608
                 |
          gender |
          Female |  -.3618356   .0504085    -7.18   0.000    -.4606344   -.2630368
          invtime |    .928681   .0716255    12.97   0.000     .7882977    1.069064
  clst_prov_dist |  -.0716454   .0079194    -9.05   0.000    -.0871672   -.0561235
                 |
          region |
Western Maryl..  |   .4121357   .0972739     4.24   0.000     .2214823     .602789
     DC Suburbs  |   .0797568   .0647454     1.23   0.218    -.0471418    .2066554
Southern Mary..  |   .1809448   .1197528     1.51   0.131    -.0537664     .415656
Upper Eastern..  |    .660195   .1311018     5.04   0.000     .4032402    .9171498
Middle Easter..  |    .386591   .1753475     2.20   0.027     .0429163    .7302658
Lower Eastern..  |   .0324425   .1558225     0.21   0.835     -.272964    .3378491
                 |
pos_mcare_mos_~y |
  Some Medicare  |   .2445714   .0508942     4.81   0.000     .1448207    .3443221
                 |
       race_abrg |
          Black  |  -.0533759   .0535132    -1.00   0.319    -.1582599     .051508
       Hispanic  |   .0278916   .2000672     0.14   0.889    -.3642329    .4200162
          Other  |  -.1942161   .1300085    -1.49   0.135     -.449028    .0605958
                 |
    mdg_prior_fy |
Major Depress..  |  -.7548885   .0814011    -9.27   0.000    -.9144317   -.5953453
Bi-Polar Diso..  |  -.2971627   .0699669    -4.25   0.000    -.4342953   -.1600301
Delusional Ps..  |  -.8892193   .1078287    -8.25   0.000     -1.10056    -.677879
Schizotypal B..  |   -.385735   .3119981    -1.24   0.216      -.99724      .22577
                 |
     cntyfyurate |  -.1674964   .0195849    -8.55   0.000    -.2058821   -.1291107
           _cons |  -1.587093   .1505685   -10.54   0.000    -1.882202   -1.291984
------------------------------------------------------------------------------
```

*******COHORT 2 (FY2003) CLOGLOG TAKE UP REGRESSION WITH invtime**********

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_p
> rior_fy inp_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender invtime clst
> _prov_dist i.region i.pos_mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy cntyfyura
> te if cohort_pooled==1, vce(cluster maskid)

Iteration 0:   log pseudolikelihood =  -2196.445
Iteration 1:   log pseudolikelihood =  -2196.242
Iteration 2:   log pseudolikelihood = -2196.2406
Iteration 3:   log pseudolikelihood = -2196.2406

Complementary log-log regression                Number of obs     =     35,378
                                                Zero outcomes     =     34,945
                                                Nonzero outcomes  =        433

                                                Wald chi2(24)     =     257.77
Log pseudolikelihood = -2196.2406               Prob > chi2       =     0.0000

                                 (Std. Err. adjusted for 5,878 clusters in maskid)
------------------------------------------------------------------------------
                |               Robust
        take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------+-------------------------------------------------------------
prior_yr_scale~f |   .0273103    .007235     3.77   0.000       .01313    .0414906
1.ltc_dummy_pr~y |  -1.283664   .6751612    -1.90   0.057    -2.606955    .0396278
inp_sud_days_p~y |  -.1326938   .1221403    -1.09   0.277    -.3720844    .1066968
inp_somatic~r_fy |  -.0874583   .0558282    -1.57   0.117    -.1968795     .021963
inp_smh_days_p~y |   .0171812   .0083081     2.07   0.039     .0008976    .0334648
             age |   -.029878   .0047332    -6.31   0.000    -.0391548   -.0206012
                 |
          gender |
          Female |  -.4721099   .1021779    -4.62   0.000     -.672375   -.2718449
         invtime |   .6070515   .1484739     4.09   0.000     .3160481     .898055
  clst_prov_dist |  -.0369493   .0140279    -2.63   0.008    -.0644436   -.0094551
                 |
          region |
Western Maryl..  |   .1215684   .2090966     0.58   0.561    -.2882534    .5313901
     DC Suburbs  |  -.2102882   .1424195    -1.48   0.140    -.4894253    .0688488
Southern Mary..  |  -.1819835   .2552132    -0.71   0.476    -.6821921    .3182251
Upper Eastern..  |    .622428   .2685207     2.32   0.020     .0961372    1.148719
Middle Easter..  |    .561698   .3127012     1.80   0.072     -.051185    1.174581
Lower Eastern..  |   .1278069   .2785591     0.46   0.646    -.4181588    .6737727
                 |
pos_mcare_mos_~y |
  Some Medicare  |   .3081189   .1172423     2.63   0.009     .0783282    .5379096
                 |
       race_abrg |
          Black  |  -.0211274    .115255    -0.18   0.855     -.247023    .2047683
       Hispanic  |  -.1118337    .597733    -0.19   0.852    -1.283369    1.059701
          Other  |   .0189896   .2301495     0.08   0.934    -.4320952    .4700743
                 |
    mdg_prior_fy |
Major Depress..  |  -.7068207   .1343336    -5.26   0.000    -.9701098   -.4435317
Bi-Polar Diso..  |  -.3874296   .1291028    -3.00   0.003    -.6404666   -.1343927
Delusional Ps..  |  -.9083656   .2061199    -4.41   0.000    -1.312353   -.5043781
Schizotypal B..  |  -1.620646   1.010807    -1.60   0.109    -3.601791    .3604998
                 |
     cntyfyurate |   -.164039   .0358543    -4.58   0.000    -.2343121   -.0937659
           _cons |  -1.869405   .2980047    -6.27   0.000    -2.453484   -1.285327
------------------------------------------------------------------------------
```

*******COHORT 3 (FY2004) CLOGLOG TAKE UP REGRESSION WITH invtime**********

```
. cloglog take_up prior_yr_scaled_all_erngs_def i.ltc_dummy_prior_fy inp_sud_days_p
> rior_fy inp_somatic_days_prior_fy inp_smh_days_prior_fy age i.gender invtime clst
> _prov_dist i.region i.pos_mcare_mos_prior_fy i.race_abrg i.mdg_prior_fy cntyfyura
> te if cohort_pooled==2, vce(cluster maskid)
note: 0.ltc_dummy_prior_fy != 1 predicts failure perfectly
      0.ltc_dummy_prior_fy dropped and 710 obs not used

note: 1.ltc_dummy_prior_fy omitted because of collinearity

Iteration 0:   log pseudolikelihood = -1713.8818
Iteration 1:   log pseudolikelihood = -1713.7769
Iteration 2:   log pseudolikelihood = -1713.7768

Complementary log-log regression                Number of obs     =     28,234
                                                Zero outcomes     =     27,898
                                                Nonzero outcomes  =        336

                                                Wald chi2(23)     =     222.12
Log pseudolikelihood = -1713.7768               Prob > chi2       =     0.0000

                                 (Std. Err. adjusted for 5,247 clusters in maskid)
------------------------------------------------------------------------------
                |               Robust
        take_up |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------+-------------------------------------------------------------
prior_yr_scale~f |   .0146823   .0057444     2.56   0.011     .0034235    .0259411
1.ltc_dummy_pr~y |          0  (empty)
inp_sud_days_p~y |  -.0857165   .1383135    -0.62   0.535    -.3568059    .1853729
inp_somatic~r_fy |  -.0747873   .0417384    -1.79   0.073    -.1565931    .0070185
inp_smh_days_p~y |    .005611   .0107192     0.52   0.601    -.0153981    .0266202
             age |  -.0175833   .0048972    -3.59   0.000    -.0271816    -.007985
                |
          gender |
          Female |  -.4997992   .1175074    -4.25   0.000    -.7301094    -.269489
          invtime |   .6557336   .1658453     3.95   0.000     .3306827    .9807844
  clst_prov_dist |  -.0456461   .0140348    -3.25   0.001    -.0731537   -.0181385
                |
          region |
Western Maryl.. |   .4202693    .218732     1.92   0.055    -.0084376    .8489763
     DC Suburbs |   .1334461   .1539839     0.87   0.386    -.1683568    .4352489
Southern Mary.. |   .3270304   .2582488     1.27   0.205    -.1791279    .8331887
Upper Eastern.. |  -.1417488   .4267474    -0.33   0.740    -.9781582    .6946607
Middle Easter.. |   .7297549   .3345975     2.18   0.029     .0739559    1.385554
Lower Eastern.. |   .1136221   .3404755     0.33   0.739    -.5536976    .7809417
                |
pos_mcare_mos_~y |
  Some Medicare |   .0785935   .1417641     0.55   0.579     -.199259    .3564459
                |
       race_abrg |
          Black |  -.0913341     .12493    -0.73   0.465    -.3361924    .1535242
       Hispanic |  -.4562949   .5066959    -0.90   0.368    -1.449401    .5368107
          Other |  -.2798661   .2846165    -0.98   0.325    -.8377043     .277972
                |
    mdg_prior_fy |
Major Depress.. |  -.8197943   .1490066    -5.50   0.000    -1.111842   -.5277468
Bi-Polar Diso.. |  -.3232645   .1466637    -2.20   0.028      -.61072    -.035809
Delusional Ps.. |  -.9305474   .2319375    -4.01   0.000    -1.385136   -.4759583
Schizotypal B.. |  -.3082979   .5883221    -0.52   0.600    -1.461388    .8447922
                |
     cntyfyurate |  -.2135461   .0408931    -5.22   0.000    -.2936951   -.1333972
           _cons |  -2.080833    .309491    -6.72   0.000    -2.687425   -1.474242
------------------------------------------------------------------------------
```