# Appendix A: Detailed Model Specification for Plan Exit and Carve-out Analyses

## Plan Exit Analysis

The Generalized Estimating Equations (GEE) model used to estimate the probability of plan exit and the change in this probability from 2000 to 2001 and 2002 was:

$$\text{logit (pr (EXIT))}_{pt} = \alpha_0 + \alpha_1 \text{YEAR01}_t + \alpha_2 \text{YEAR02}_t + \alpha_3 \text{PLANTYPE}_p + \alpha_4 \text{VLIMITS(LESS)}_p + \alpha_5 \text{VLIMITS(MORE)}_p + \alpha_6 \text{DLIMITS(LESS)}_p + \alpha_7 \text{DLIMITS(MORE)}_p + \alpha_8 \text{CSHARE}_p + \alpha_8 \text{MEDCSHARE}_p + \alpha_9 \text{ENROLL}_p + \alpha_{10} \text{REGION1}_p + \alpha_{11} \text{REGION2}_p + \alpha_{12} \text{REGION3}_p + \alpha_{13} \text{REGION4}_p + \alpha_{14} \text{YEAR01}_t * \text{VLIMITS(LESS)}_p + \alpha_{15} \text{YEAR01}_t * \text{VLIMITS(MORE)}_p + \alpha_{16} \text{YEAR02}_t * \text{VLIMITS(LESS)}_p + \alpha_{17} \text{YEAR02}_t * \text{VLIMITS(MORE)}_p + \alpha_{18} \text{YEAR01}_t * \text{DLIMITS(LESS)}_p + \alpha_{19} \text{YEAR01} * \text{DLIMITS(MORE)}_p + \alpha_{20} \text{YEAR02}_t * \text{DLIMITS(LESS)}_p + \alpha_{21} \text{YEAR02}_t * \text{DLIMITS(MORE)}_p \tag{1.1}$$

in which

- EXIT indicates whether a health plan exited the FEHB Program,

- p indexes health plans,

- t indexes time,

- YEAR01 and YEAR02 are year dummies indicating whether the time period was either post-parity year (2001 or 2002) compared with 2000, the pre-parity year,

- PLANTYPE indicate whether a plan was an HMO or FFS,

- VLIMITS(LESS) indicates whether a health plan had less restrictive outpatient limits of between 31 and 60 visits a year compared to no limits before parity,

- VLIMITS (MORE) indicates whether a health plan had more restrictive outpatient limits of between 20 and 30 visits a year compared with no limits,

- DLIMITS(LESS) indicates whether a health plan had less restrictive inpatient day limits of between 31 and 60 days a year compared to no limits before parity,

- DLIMITS(MORE) indicates whether a health plan had more restrictive inpatient day limits of between 20 and 30 days a year compared with no limits,

- CSHARE indicates a copayment equal to or greater than \$25 and coinsurance equal to or greater than 40 percent for outpatient mental health services in 2000,

- MEDCSHARE indicates a general medical copayment of either greater than or less than \$10,[1]

- ENROLL refers to FEHB Program plan enrollment size measured at a single point in time (2002)[2], and

- four REGION dummies indicate whether a health plan was available nationwide or located in one of three regions (Northwest, Midwest, and South) compared with an omitted region, the West.

## Carve-out Analyses

The GEE model used to estimate the probability of plan carve-out and the change in this probability from pre- to post-parity, as well as the comparison of this probability for FEHB versus Medstat plans, was:

$$\text{logit (pr (CO))}_{pt} = \alpha_0 + \alpha_1 POST_t + \alpha_2 PARITY_p + \alpha_3 PLANTYPE_p + \alpha_4 ENROLL_p + \alpha_5 REGION1_p + \alpha_6 REGION2_p + \alpha_7 REGION3_p + \alpha_8 REGION4_p + \alpha_9 POST_t * PARITY_p \quad (1.2)$$

in which

- CO, the outcome variable, indicates the probability of carving out,
- $p$ indexes plans,
- $t$ indexes time,
- POST indicates whether the time period was before or after parity implementation,
- PARITY indicates whether a plan was an FEHB plan or a Medstat plan,
- PLANTYPE indicates whether the plan was a FFS/PPO (preferred provider organization) or an HMO/POS (point of service) plan, and
- the enrollment and region variables are defined as in Equation 1.1.

Since this estimation model was non-linear, the PERT could not interpret the coefficient of the interaction of POST and PARITY in Equation 1.2 directly, but rather computed the cross difference as indicated in 1.3 and the standard errors using the approach developed by Ai and Norton (2003). Predicted probabilities of carving out were calculated as:

$$Diff-in-Diff = (\hat{Y}_{1,1} - \hat{Y}_{1,0}) - (\hat{Y}_{0,1} - \hat{Y}_{0,0}) \quad (1.3)$$

in which $\hat{Y}_{1,1}$ was defined as the predicted probability of carving out among FEHB plans after parity in 2001 (parity equals 1, post equals 1). In comparison, $\hat{Y}_{1,0}$ indicated the predicted probability of carving out among FEHB plans before parity in 2000 (parity equals 1, post equals 0). Similarly, $\hat{Y}_{0,1}$ was defined as the predicted probability of carving out among Medstat comparison plans in 2001 (parity equals 0, post equals 1), and $\hat{Y}_{0,0}$ was defined as the predicted probability of carving out among Medstat plans in 2000

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[1] Results were qualitatively similar testing different cut-points for construction of limit and cost-sharing variables.

[2] Relative plan enrollment did not tend to vary substantially across years.

(parity equals 0, post equals 0). This calculation produced a net impact estimate of the change from before to after parity in the predicted probability of carving out among FEHB plans as a percentage of the change among Medstat plans.

The GEE model used to estimate the probability of plan carve-out and the change in this probability from pre- to post-parity was:

$$\text{logit (pr (CO))}_{pt} = \alpha_0 + \alpha_1 POST_t + \alpha_2 ASSOCIATION_p + \alpha_3 VLIMITS(LESS)_p + \alpha_4 VLIMITS(MORE)_p + \alpha_5 DLIMITS(LESS)_p + \alpha_6 DLIMITS(MORE)_p + \alpha_7 CSHARE_p + \alpha_8 ENROLL_p + \alpha_9 REGION1_p + \alpha_{10} REGION2p + \alpha_{11} REGION3p + \alpha_{12} REGION4p + \alpha_{13} POSTt*ASSOCIATIONp + \alpha_{14} POST_t *VLIMITS(LESS)_p + \alpha_{15} POST_t *VLIMITS(MORE)_p \quad (1.4)$$

in which

- CO indicates the probability of carving out,
- p indexes health plans,
- t indexes time,
- POST indicates whether the year was before or after parity implementation,
- ASSOCIATION indicates whether the plan was an Association or non-Association plan, pre-parity visit limit, day limit, and cost sharing dummies in 2000 were constructed as in Equation 1.1, and
- the enrollment and region variables are constructed as in Equation 1.1.

For this model, a variable for plan type was not included because of the high correlation between plan type and the Association dummy. In addition, in Equation 1.4, the pre-parity visit limit, day limit, and cost sharing dummies in 2000 captured benefit information in 2000 to determine whether pre-parity benefits affected carving out.[3]

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[3] Separate analyses (results not presented) using 1999 health plan pre-parity benefit variables rather than 2000 pre-parity benefit variables produced similar results.