Frequency of churn on International Plan indicator

The FREQ Procedure

Frequency Percent Row Pct Col Pct	Table of V_churn by int_plan_ind		
	int_plan_ind		
V_churn	0	1	Total
0	2664 79.93 93.47 88.50	186 5.58 6.53 57.59	2850 85.51
1	346 10.38 71.64 11.50	137 4.11 28.36 42.41	483 14.49
Total	3010 90.31	323 9.69	3333 100.00

Logistic regression for churn on International Plan indicator

The LOGISTIC Procedure

Model Information	
Data Set	WORK.CHURN_2
Response Variable	V_churn
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	3333
Number of Observations Used	3333

Response Profile		
Ordered Value	**V_churn**	**Total Frequency**
1	1	483
2	0	2850

Probability modeled is V_churn=1.

Class Level Information		
Class	**Value**	**Design Variables**
int_plan_ind	**0**	0
	1	1

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	2760.293	2591.894
SC	2766.405	2604.117
-2 Log L	2758.293	2587.894

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	170.3998	1	<.0001
Score	225.0541	1	<.0001
Wald	188.9385	1	<.0001

Logistic regression for churn on International Plan indicator

The LOGISTIC Procedure

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
int_plan_ind	1	188.9385	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	-2.0411	0.0571	1275.8266	<.0001
int_plan_ind	1	1	1.7355	0.1263	188.9385	<.0001

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
int_plan_ind 1 vs 0	5.672	4.428	7.264

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	26.5	Somers' D	0.218
Percent Discordant	4.7	Gamma	0.700
Percent Tied	68.8	Tau-a	0.054
Pairs	1376550	c	0.609

The FREQ Procedure

Frequency
Percent
Row Pct
Col Pct

Table of V_churn by V_voiceplan			
	V_voiceplan		
V_churn	0	1	Total
0	842 25.26 29.54 91.32	2008 60.25 70.46 83.28	2850 85.51
1	80 2.40 16.56 8.68	403 12.09 83.44 16.72	483 14.49
Total	922 27.66	2411 72.34	3333 100.00

Logistic regression for churn on Voice Plan indicator

The LOGISTIC Procedure

Model Information	
Data Set	WORK.CHURN_2
Response Variable	V_churn
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	3333
Number of Observations Used	3333

Response Profile		
Ordered Value	**V_churn**	**Total Frequency**
1	1	483
2	0	2850

Probability modeled is V_churn=1.

Class Level Information		
Class	**Value**	**Design Variables**
V_voiceplan	**0**	0
	1	1

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	2760.293	2724.329
SC	2766.405	2736.552
-2 Log L	2758.293	2720.329

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	37.9643	1	<.0001
Score	34.7773	1	<.0001
Wald	33.5505	1	<.0001

Logistic regression for churn on Voice Plan indicator

The LOGISTIC Procedure

Type 3 Analysis of Effects			
Effect	**DF**	**Wald Chi-Square**	**Pr > ChiSq**
V_voiceplan	1	33.5505	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept		1	-2.3537	0.1170	404.7557	<.0001
V_voiceplan	**1**	1	0.7478	0.1291	33.5505	<.0001

Odds Ratio Estimates			
Effect	**Point Estimate**	**95% Wald Confidence Limits**	
V_voiceplan 1 vs 0	2.112	1.640	2.721

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	24.7	**Somers' D**	0.130
Percent Discordant	11.7	**Gamma**	0.357
Percent Tied	63.7	**Tau-a**	0.032
Pairs	1376550	**c**	0.565

The FREQ Procedure

Frequency Percent Row Pct Col Pct

Table of V_churn by V_CSC2			
	V_CSC2		
V_churn	0	1	Total
0	2721 81.64 95.47 88.75	129 3.87 4.53 48.31	2850 85.51
1	345 10.35 71.43 11.25	138 4.14 28.57 51.69	483 14.49
Total	3066 91.99	267 8.01	3333 100.00

The LOGISTIC Procedure

Model Information	
Data Set	WORK.CHURN_2
Response Variable	V_churn
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	3333
Number of Observations Used	3333

Response Profile		
Ordered Value	**V_churn**	**Total Frequency**
1	1	483
2	0	2850

Probability modeled is V_churn=1.

Class Level Information		
Class	**Value**	**Design Variables**
V_CSC2	**0**	0
	1	1

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	2760.293	2530.836
SC	2766.405	2543.059
-2 Log L	2758.293	2526.836

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	231.4577	1	<.0001
Score	324.0392	1	<.0001
Wald	249.0204	1	<.0001

The LOGISTIC Procedure

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
V_CSC2	1	249.0204	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	-2.0652	0.0571	1305.8824	<.0001
V_CSC2	1	1	2.1327	0.1351	249.0204	<.0001

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
V_CSC2 1 vs 0	8.437	6.474	10.996

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	27.3	Somers' D	0.240
Percent Discordant	3.2	Gamma	0.788
Percent Tied	69.5	Tau-a	0.060
Pairs	1376550	c	0.620

Logistic regression for churn on account length

The LOGISTIC Procedure

Model Information	
Data Set	WORK.CHURN_2
Response Variable	V_churn
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	3333
Number of Observations Used	3333

Response Profile		
Ordered Value	**V_churn**	**Total Frequency**
1	1	483
2	0	2850

Probability modeled is V_churn=1.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	2760.293	2761.328
SC	2766.405	2773.551
-2 Log L	2758.293	2757.328

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	0.9651	1	0.3259
Score	0.9629	1	0.3265
Wald	0.9625	1	0.3266

Analysis of Maximum Likelihood Estimates					
Parameter	**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept	1	-2.0119	0.2472	66.2228	<.0001
acc_length	1	0.0942	0.0961	0.9625	0.3266

Logistic regression for churn on account length

The LOGISTIC Procedure

Odds Ratio Estimates			
Effect	**Point Estimate**	**95% Wald Confidence Limits**	
acc_length	1.099	0.910	1.326

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	26.4	**Somers' D**	0.023
Percent Discordant	24.1	**Gamma**	0.045
Percent Tied	49.5	**Tau-a**	0.006
Pairs	1376550	**c**	0.511

Logistic regression for churn on day minutes

The LOGISTIC Procedure

Model Information	
Data Set	WORK.CHURN_2
Response Variable	V_churn
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	3333
Number of Observations Used	3333

Response Profile		
Ordered Value	**V_churn**	**Total Frequency**
1	1	483
2	0	2850

Probability modeled is V_churn=1.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	2760.293	2618.258
SC	2766.405	2630.481
-2 Log L	2758.293	2614.258

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	144.0353	1	<.0001
Score	140.2755	1	<.0001
Wald	133.6523	1	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept	1	-3.9292	0.2028	375.3057	<.0001
day_minutes	1	0.0113	0.000975	133.6523	<.0001

Logistic regression for churn on day minutes

The LOGISTIC Procedure

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
day_minutes	1.011	1.009	1.013

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	63.7	Somers' D	0.280
Percent Discordant	35.7	Gamma	0.282
Percent Tied	0.7	Tau-a	0.069
Pairs	1376550	c	0.640

Logistic regression for churn on evening minutes

The LOGISTIC Procedure

Model Information	
Data Set	WORK.CHURN_2
Response Variable	V_churn
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	3333
Number of Observations Used	3333

Response Profile		
Ordered Value	**V_churn**	**Total Frequency**
1	1	483
2	0	2850

Probability modeled is V_churn=1.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	2760.293	2733.426
SC	2766.405	2745.649
-2 Log L	2758.293	2729.426

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	28.8676	1	<.0001
Score	28.7007	1	<.0001
Wald	28.4504	1	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept	1	-2.8563	0.2131	179.6107	<.0001
eve_minutes	1	0.00526	0.000985	28.4504	<.0001

Logistic regression for churn on evening minutes

The LOGISTIC Procedure

Odds Ratio Estimates			
Effect	**Point Estimate**	**95% Wald Confidence Limits**	
eve_minutes	1.005	1.003	1.007

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	56.4	**Somers' D**	0.146
Percent Discordant	41.9	**Gamma**	0.148
Percent Tied	1.7	**Tau-a**	0.036
Pairs	1376550	**c**	0.573

Logistic regression for churn on night minutes

The LOGISTIC Procedure

Model Information	
Data Set	WORK.CHURN_2
Response Variable	V_churn
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	3333
Number of Observations Used	3333

Response Profile		
Ordered Value	**V_churn**	**Total Frequency**
1	1	483
2	0	2850

Probability modeled is V_churn=1.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	2760.293	2758.093
SC	2766.405	2770.316
-2 Log L	2758.293	2754.093

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	4.2004	1	0.0404
Score	4.1987	1	0.0405
Wald	4.1935	1	0.0406

Analysis of Maximum Likelihood Estimates					
Parameter	**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept	1	-2.1796	0.2053	112.7255	<.0001
night_minutes	1	0.00200	0.000975	4.1935	0.0406

Logistic regression for churn on night minutes

The LOGISTIC Procedure

Odds Ratio Estimates			
Effect	**Point Estimate**	**95% Wald Confidence Limits**	
night_minutes	1.002	1.000	1.004

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	50.6	**Somers' D**	0.059
Percent Discordant	44.7	**Gamma**	0.061
Percent Tied	4.7	**Tau-a**	0.015
Pairs	1376550	**c**	0.529

Logistic regression for churn on international minutes

The LOGISTIC Procedure

Model Information	
Data Set	WORK.CHURN_2
Response Variable	V_churn
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring

Number of Observations Read	3333
Number of Observations Used	3333

Response Profile		
Ordered Value	**V_churn**	**Total Frequency**
1	1	483
2	0	2850

Probability modeled is V_churn=1.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	2760.293	2746.566
SC	2766.405	2758.789
-2 Log L	2758.293	2742.566

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	15.7272	1	<.0001
Score	15.5202	1	<.0001
Wald	15.4582	1	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept	1	-2.5145	0.1978	161.6449	<.0001
intl_minutes	1	0.0709	0.0180	15.4582	<.0001

Logistic regression for churn on international minutes

The LOGISTIC Procedure

Odds Ratio Estimates			
Effect	**Point Estimate**	**95% Wald Confidence Limits**	
intl_minutes	1.073	1.036	1.112

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	53.8	**Somers' D**	0.100
Percent Discordant	43.8	**Gamma**	0.103
Percent Tied	2.4	**Tau-a**	0.025
Pairs	1376550	**c**	0.550