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Economics 312 Final Project

Introduction

In this project, we chose to examine the effects of various demographic and academic variables on Reed students' choice of major. Based on general skill sets and incentive structures, we decided to categorize majors into three discrete categories, namely "Mathematics and Natural Science majors," "Economics majors," and "Other." Given that our dependent variable takes three discrete values, we chose to approach the problem using a multinomial logit model. As such, the interpretation of our results is largely in the form of probability at the margin of choosing one major group or another.

Data

We adapted our dataset from the datasets Reed.dta and Reed FY GPA.dta, both of which were provided to us by Jeffrey Parker. Our only major changes to these datasets were in dropping observations for individuals who did not graduate and creating dummy variables out of string variables (ie: for *ethnic*, *major*, and *gender*). We also recoded the *citz* variable (which originally had five categories: OR citizen, Other U.S citizen, Permanent Resident, Foreign National, and Unkown) to only have three categories: U.S citizens, Foreigners (Permanent Residents and Foreign Nationals), and Unkown. We chose to recode *citz* in this way because we are mainly interested in whether or not major choices differ between U.S citizens and foreigners.

Our final dataset, reededit7.dta, contains 4662 observations; however, most of our regressions only included approximately half that number due to missing data, especially in the fygpa and fygpa_hum variables.

Our variables are as follows:

Variable	Values if indicator variables	Label
major2 (Dependent Variable)	1	Non-mathematics, non-science, non-economics majors
	2	Mathematics or natural Science majors
	3	Economics majors
Rdr		Reader Rating
Finaid	0	No Financial Aid received
	1	Financial Aid received
Satv		SAT verbal score
Satm		SAT mathematics score
Citz	0	US citizen
	1	non-US citizen
	2	Unknown
ethnic2	0	Caucasian
	1	Asian
	2	Black
	3	Hispanic
	4	Native American
	5	Other
	6	Unknown
gender2	0	Male
	1	Female
Fygpa		Freshman year gpa
fygpa_hum		Freshman year humanitites grade
fygpa_hours		Units completed freshman year
year3	0 through 21	Calendar year graduated – 1985. Specifically, we have 21 years of data with a dummy for each year, in ascending order of years.

Variables Summary

```
. summarize finaid satv satm citz year3 fygpa fygpa_hum fygpahours gender2 ethni
>  major2 rdr, detail
```

Financial Aid Dummy

Percentiles		Smallest		
1%	0	0		
5%	0	0		
10%	0	0	Obs	4662
25%	0	0	Sum of Wgt.	4662
50%	1		Mean	.535607
		Largest	Std. Dev.	.498784
75%	1	1		
90%	1	1	Variance	.2487855
95%	1	1	Skewness	-.1427907
99%	1	1	Kurtosis	1.020389

SATV

Percentiles		Smallest		
1%	480	350		
5%	560	360		
10%	590	360	Obs	4441
25%	640	360	Sum of Wgt.	4441
50%	680		Mean	681.742
		Largest	Std. Dev.	71.78249
75%	730	800		
90%	780	800	Variance	5152.725
95%	800	800	Skewness	-.500899
99%	800	800	Kurtosis	3.471864

SATM

Percentiles		Smallest		
1%	460	370		
5%	520	380		
10%	550	390	Obs	4441
25%	600	400	Sum of Wgt.	4441
50%	650		Mean	642.4868
		Largest	Std. Dev.	74.61262
75%	690	800		
90%	740	800	Variance	5567.043
95%	770	800	Skewness	-.1762929
99%	800	800	Kurtosis	2.94689

CITZ

Percentiles		Smallest		
1%	0	0		
5%	0	0		
10%	0	0	Obs	4604
25%	0	0	Sum of Wgt.	4604
50%	0		Mean	.0582103
		Largest	Std. Dev.	.236933
75%	0	1		
90%	0	2	Variance	.0561372
95%	1	2	Skewness	3.919963
99%	1	2	Kurtosis	17.15678

year3

	Percentiles	Smallest		
1%	4	0		
5%	4	0		
10%	5	1	Obs	4662
25%	8	2	Sum of Wgt.	4662
50%	12		Mean	12.30802
		Largest	Std. Dev.	5.025523
75%	17	21		
90%	19	21	Variance	25.25588
95%	20	21	Skewness	-.0494604
99%	21	21	Kurtosis	1.778037

fygpa

	Percentiles	Smallest		
1%	1.85	1		
5%	2.225	1.142857		
10%	2.4	1.442857	Obs	2371
25%	2.714286	1.444444	Sum of Wgt.	2371
50%	3.085714		Mean	3.047156
		Largest	Std. Dev.	.4811967
75%	3.4125	4		
90%	3.655556	4	Variance	.2315503
95%	3.788889	4	Skewness	-.3837586
99%	3.9625	4	Kurtosis	2.919246

fygpa_hum

	Percentiles	Smallest		
1%	1.65	.5000001		
5%	2	.9999999		
10%	2.25	1	Obs	2356
25%	2.65	1.22	Sum of Wgt.	2356
50%	3.025		Mean	3.000654
		Largest	Std. Dev.	.5541215
75%	3.408333	4		
90%	3.72	4	Variance	.3070507
95%	3.85	4	Skewness	-.3996171
99%	4	4	Kurtosis	2.887218

fygpahours

	Percentiles	Smallest		
1%	4.5	1		
5%	6.5	1		
10%	7	1.5	Obs	2371
25%	7	2	Sum of Wgt.	2371
50%	8		Mean	7.591733
		Largest	Std. Dev.	.9044657
75%	8	10		
90%	9	10	Variance	.8180582
95%	9	10	Skewness	-1.244156
99%	9	10	Kurtosis	9.154116

major2

	Percentiles	Smallest		
1%	1	1		
5%	1	1		
10%	1	1	Obs	4662
25%	1	1	Sum of Wgt.	4662
50%	1		Mean	1.358859
		Largest	Std. Dev.	.5446447
75%	2	3		
90%	2	3	Variance	.2966379
95%	2	3	Skewness	1.194013
99%	3	3	Kurtosis	3.430869

RDR

	Percentiles	Smallest		
1%	1.35	1		
5%	1.75	1		
10%	2	1	Obs	4622
25%	2.25	1	Sum of Wgt.	4622
50%	2.75		Mean	2.67863
		Largest	Std. Dev.	.5836287
75%	3	5		
90%	3.5	5	Variance	.3406224
95%	3.5	5	Skewness	.0110221
99%	4	5	Kurtosis	3.008464

gender2

	Percentiles	Smallest		
1%	0	0		
5%	0	0		
10%	0	0	Obs	4662
25%	0	0	Sum of Wgt.	4662
50%	1		Mean	.5066495
		Largest	Std. Dev.	.5000094
75%	1	1		
90%	1	1	Variance	.2500094
95%	1	1	Skewness	-.0266004
99%	1	1	Kurtosis	1.000708

ethnic2

	Percentiles	Smallest		
1%	0	0		
5%	0	0		
10%	0	0	Obs	4655
25%	0	0	Sum of Wgt.	4655
50%	0		Mean	1.099678
		Largest	Std. Dev.	2.126316
75%	1	6		
90%	6	6	Variance	4.521218
95%	6	6	Skewness	1.668817
99%	6	6	Kurtosis	4.020763

Our Initial model

The variables we chose to include in our initial regression are as follows: *rdr*, *finaid*, *satv*, *satm*, *ethnic2*, *citz*, *gender2*, *fygpa*, *year3*. Below we give a brief overview of the theory and assumptions behind our choice to include each of these variables.

- *rdr*: We include rdr because we believe that it is a decent measure of students' future academic performances which in turn determine the choice of majors. As such, we think that it would be interresting to know the correlation between rdr and Reed students' choice of major. initially assumed that low (better) reader ratings would be correlated with choosing to become a Math or Science Major. This hypothesis comes from a bias towards believing that Math and Science are more "difficult" majors and that students who excelled in these fields in highschool would also likely excell in "softer" areas of study.
- *finaid*: We include financial aid status in our regression as a proxy for socioeconomic status, to test whether socioeconomic status has any effect on choice of major. Our hypothesis is that students enjoying high socioeconomic backrounds feel less pressure to major in "practical" fields that will make them competive in job markets. We therefore expect students who did not receive financial aid to have a higher probability of majoring in our "other" category.
- *satv* and *satm*: Our expectation is that students receiving relatively higher scores on the mathematics portion of the SAT exam are more likely to major in fields that demand quantitative skills, namely: Mathematics, the Natural Sciences and Economics. We are unsure if the inverse is true for students receiving relatively high verbal scores (do these students have a tendency to major in the "Other" category?).
- *ethnic2*: The conventional belief in the USA is that there is a disproportional prevalance of people of Asian descent in Mathematics and Natural Science fields, as well as in Economics. We want to test this hypothesis empirically and also wonder if individuals from any other ethnic backgrounds have a tendency to major in one area

over the other two categories we include in our dataset. Therefore we include ethnicity as a (dummy) regressor to test this empirically.

- *citz*: Relatedly, conventional wisdom and our anecdotal experience at Reed has led us to believe that non-American citizens have a disproportional tendency to major in Mathematics, Natural Sciences, and Economics, hence the dummy variable for citizenship is included in our initial regression.
- *gender2*: We expect to find that female students are less likely to major in Math, the Natural Sciences, and Economics, as these fields are widely considered to be dominated by males.
- *fygpa*: We include Freshman year GPA in our regression because we are curious as to whether those receiving higher grades freshman year have a tendency to major in Math or the Natural Sciences. We chose to use Freshman Year GPA rather than Reed GPA to minimise problems of endogeneity between major choice and grade as classes in different majors at Reed have different grade distributions. In later regressions, we include the variable *fygpa_hum*, predicting that those who enjoyed (and did better in) Humanities 110 would be more likely to major in the "Other" category. We also include *fygpahours* in a few of our later regressions to see if course overloads and underloads effected students' major choice.
- *year3*: We include a year variable to test whether any specific years were correlated with a higher probability of students entering into one major category over the other two. We suspected that changes in the probabilities for major choice according to year would be due to economic, social, and political events occuring in the nation.

Our regression output is shown on the next page.

```
. mlogit major2 rdr i.finaid satv satm i.citz i.ethnic2 i.gender2 ib11.year3 fygpa

Iteration 0:   log likelihood =   -1671.78
Iteration 1:   log likelihood = -1468.6475
Iteration 2:   log likelihood = -1455.6097
Iteration 3:   log likelihood = -1455.2831
Iteration 4:   log likelihood = -1455.2073
Iteration 5:   log likelihood = -1455.1917
Iteration 6:   log likelihood = -1455.1885
Iteration 7:   log likelihood = -1455.1877
Iteration 8:   log likelihood = -1455.1875
Iteration 9:   log likelihood = -1455.1875
Iteration 10:  log likelihood = -1455.1875

Multinomial logistic regression                 Number of obs   =       2254
                                                LR chi2(56)     =     433.19
                                                Prob > chi2     =     0.0000
Log likelihood = -1455.1875                     Pseudo R2       =     0.1296

------------------------------------------------------------------------------
      major2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
1            |  (base outcome)
-------------+----------------------------------------------------------------
2            |
         rdr |  -.5235844   .1222429    -4.28   0.000    -.7631761   -.2839927
    1.finaid |   .2497639   .1069201     2.34   0.019     .0402044    .4593235
        satv |  -.0063947   .0008443    -7.57   0.000    -.0080496   -.0047398
        satm |   .0107093   .0008906    12.03   0.000     .0089638    .0124548
             |
        citz |
          1  |   .3910415   .2215801     1.76   0.078    -.0432476    .8253306
          2  |  -13.59995   3983.544    -0.00   0.997    -7821.204    7794.004
             |
     ethnic2 |
          1  |   .7786423   .1916372     4.06   0.000     .4030403    1.154244
          2  |   .4875157    .504816     0.97   0.334    -.5019056    1.476937
          3  |   .3878365   .2857206     1.36   0.175    -.1721656    .9478386
          4  |   .0116248   .5740278     0.02   0.984    -1.113449    1.136699
          5  |   .2549191   .4332862     0.59   0.556    -.5943063    1.104144
          6  |  -.2133201   .2045718    -1.04   0.297    -.6142734    .1876332
             |
   1.gender2 |  -.3903462   .1071051    -3.64   0.000    -.6002682   -.1804241
             |
       year3 |
          5  |  -13.37149   3983.544    -0.00   0.997    -7820.975    7794.232
          6  |   1.000236   .6560735     1.52   0.127    -.2856448    2.286116
          7  |   .1143087   .2607716     0.44   0.661    -.3967942    .6254116
          8  |   .2885235   .2325223     1.24   0.215    -.1672119    .7442589
          9  |  -.1622794   .2511475    -0.65   0.518    -.6545195    .3299607
         10  |   .4147645   .2225845     1.86   0.062    -.0214931     .851022
         12  |   .5437881   .2234061     2.43   0.015     .1059203    .9816559
         13  |    .163376   .2278557     0.72   0.473    -.2832131     .609965
         14  |   .0261431   .2249553     0.12   0.907    -.4147612    .4670475
         15  |   .1119192   .2245981     0.50   0.618    -.3282851    .5521234
         16  |  -.2887486   .2324373    -1.24   0.214    -.7443172    .1668201
         17  |   .1902502   .3105623     0.61   0.540    -.4184408    .7989411
         18  |  -.3620671   .6002147    -0.60   0.546    -1.538466    .8143321
         19  |  -15.31135   3983.544    -0.00   0.997    -7822.915    7792.292
             |
       fygpa |   .0585793   .1180151     0.50   0.620    -.1727261    .2898847
       _cons |  -2.329709   1.001732    -2.33   0.020    -4.293067   -.3663502
------------------------------------------------------------------------------
```

3						
rdr	.1063913	.3117416	0.34	0.733	-.5046111	.7173936
1.finaid	.5288299	.284067	1.86	0.063	-.0279311	1.085591
satv	-.0057953	.0020035	-2.89	0.004	-.0097221	-.0018686
satm	.0087392	.0021833	4.00	0.000	.0044601	.0130182
citz						
1	.9176727	.4344089	2.11	0.035	.066247	1.769098
2	-13.03198	13000.96	-0.00	0.999	-25494.44	25468.38
ethnic2						
1	1.15707	.3955484	2.93	0.003	.381809	1.93233
2	-14.83129	2079.693	-0.01	0.994	-4090.955	4061.292
3	.393202	.6555726	0.60	0.549	-.8916966	1.678101
4	-14.77008	2622.713	-0.01	0.996	-5155.193	5125.653
5	.9196497	.8022516	1.15	0.252	-.6527345	2.492034
6	-.6206355	.6197287	-1.00	0.317	-1.835281	.5940103
1.gender2	-.8894907	.2951641	-3.01	0.003	-1.468002	-.3109798
year3						
5	-13.40363	13000.96	-0.00	0.999	-25494.81	25468.01
6	1.295687	1.172867	1.10	0.269	-1.00309	3.594464
7	-.0587478	.6503263	-0.09	0.928	-1.333364	1.215868
8	-.1080179	.6001155	-0.18	0.857	-1.284223	1.068187
9	.0557045	.5530229	0.10	0.920	-1.0282	1.13961
10	.079948	.5478286	0.15	0.884	-.9937763	1.153672
12	-.5162635	.6395067	-0.81	0.420	-1.769674	.7371467
13	-.0920301	.5489252	-0.17	0.867	-1.167904	.9838435
14	-.5207009	.5974099	-0.87	0.383	-1.691603	.650201
15	.0905404	.5321564	0.17	0.865	-.952467	1.133548
16	-.13179	.5545937	-0.24	0.812	-1.218774	.9551937
17	.5111339	.7197012	0.71	0.478	-.8994545	1.921722
18	-15.19987	2235.828	-0.01	0.995	-4397.343	4366.943
19	-15.23525	13000.96	-0.00	0.999	-25496.64	25466.17
fygpa	-.1989759	.2926804	-0.68	0.497	-.772619	.3746672
_cons	-4.555838	2.475732	-1.84	0.066	-9.408183	.2965079

Testing for multicollinearity

In order to test for multicollinearity, we ran a meaningless regression with a white noise variable, “case”, and then did an estat command. All of our year variables were highly correlated with each other, which is neither surprising nor worrying, considering that these are consecutive years at the same college with a relatively unchanging incoming class, and considering also that collinearity between years does not substantially affect

the validity of our comparisons between other variables. There is negligible collinearity between other variables in the regression, except *fygpa_hum* and *fygpa* (the VIF score is still below 10 for these variables). When we include both fygpa and *fygpa_hum* in a later model, we use robust standard errors to correct for the collinearity between these variables.

```
. estat vif
```

Variable	VIF	1/VIF
rdr	**1.60**	**0.625803**
1.finaid	**1.13**	**0.883320**
satv	**1.37**	**0.730079**
satm	**1.52**	**0.658384**
citz		
1	**1.17**	**0.855753**
2	**1.01**	**0.988877**
year3		
6	**15.18**	**0.065859**
7	**135.52**	**0.007379**
8	**191.08**	**0.005233**
9	**161.44**	**0.006194**
10	**209.13**	**0.004782**
11	**206.79**	**0.004836**
12	**202.81**	**0.004931**
13	**202.06**	**0.004949**
14	**210.92**	**0.004741**
15	**227.39**	**0.004398**
16	**209.93**	**0.004764**
17	**83.91**	**0.011917**
18	**20.11**	**0.049737**
19	**2.03**	**0.493267**
fygpa	**6.93**	**0.144339**
fygpa_hum	**6.79**	**0.147341**
fygpahours	**1.13**	**0.884262**
1.gender2	**1.18**	**0.850079**
ethnic2		
1	**1.16**	**0.859702**
2	**1.04**	**0.961417**
3	**1.06**	**0.947354**
4	**1.02**	**0.983358**
5	**1.02**	**0.978392**
6	**1.10**	**0.907861**
Mean VIF	**70.28**	

Marginal Effects

Marginal Effects at Means for "Other" Major

```
. margins, dydx(rdr fygpa satv satm finaid citz gender2 ethnic2 year3) predict(ou
> come(1)) atmeans

Conditional marginal effects                    Number of obs   =       2254
Model VCE    : OIM
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.1028254	.2187217	0.47	0.638	-.3258613	.5315122
1.finaid	-.0553777	.1627861	-0.34	0.734	-.3744326	.2636773
satv	.0013377	.0017726	0.75	0.450	-.0021365	.004812
satm	-.0022292	.0028193	-0.79	0.429	-.0077549	.0032966
citz						
1	-.0960505	.3497517	-0.27	0.784	-.7815512	.5894503
2	.2966894	.6324608	0.47	0.639	-.942911	1.53629
ethnic2						
1	-.1889145	.2533763	-0.75	0.456	-.6855229	.307694
2	-.0923167	15.22008	-0.01	0.995	-29.92312	29.73849
3	-.0859768	.1136879	-0.76	0.449	-.3088011	.1368474
4	.0123733	.3412437	0.04	0.971	-.656452	.6811987
5	-.069812	.3469945	-0.20	0.841	-.7499086	.6102847
6	.0463621	.1390216	0.33	0.739	-.2261152	.3188393
1.gender2	.0880179	.2818661	0.31	0.755	-.4644295	.6404653
year3						
5	.2813801	.5566977	0.51	0.613	-.8097273	1.372488
6	-.2407432	.3237704	-0.74	0.457	-.8753215	.393835
7	-.0210946	.0750226	-0.28	0.779	-.1681362	.1259471
8	-.0561212	.1246728	-0.45	0.653	-.3004754	.1882331
9	.0281493	.0835404	0.34	0.736	-.1355868	.1918854
10	-.0856787	.1031033	-0.83	0.406	-.2877574	.1164
12	-.1091467	.2714397	-0.40	0.688	-.6411587	.4228652
13	-.030438	.0904496	-0.34	0.736	-.2077159	.14684
14	.0013311	.1861571	0.01	0.994	-.3635301	.3661923
15	-.0228308	.0493168	-0.46	0.643	-.11949	.0738284
16	.0522916	.062525	0.84	0.403	-.0702551	.1748384
17	-.0462641	.2161793	-0.21	0.831	-.4699677	.3774395
18	.0802476	12.871	0.01	0.995	-25.14645	25.30694
19	.2813806	.5566944	0.51	0.613	-.8097203	1.372482
fygpa	-.0093445	.0988244	-0.09	0.925	-.2030368	.1843478

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

For the "Other" major category, none of the marginal effects of our independent variables at the means of the other variables proved statistically significant except for *citz*2, *year*5, *year*14, and *year*19. We can ignore the "significance" of the *citz*2 variable because not only is this meaningless as the "unknown" category of citizenship, but there are also only three observations in it, and therefore it is almost definitely skewed and unreliable. Similarly, we can ignore the "significance" of years 5 (1990) and 19 (2004) because they have only 2 observations and 1 observation respectively for Freshman year GPA, resulting in a negligible number of observations for these years included in the regression. Therefore the only statistically significant finding at the 10% level at the means is for the year 14 (1999), which, looking at the coefficients, does not show a very different probability of switching to an "other" major (at the means of the other variables). On the whole, the marginal effects of the independent variables at the means on the probability of becoming an "other" major are largely uninformative. This may be due to uneven distributions of observations between major categories such that the means are not the tipping points as they would be in a normal distribution.

Average Marginal Effects for "Other" Major

```
. margins, dydx(rdr fygpa satv satm finaid citz gender2 ethnic2 year3) predict(ou
> come(1))

Average marginal effects                        Number of obs   =       2254
Model VCE    : OIM
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.0873833	.0219374	3.98	0.000	.0443868	.1303798
1.finaid	-.0509423	.0193301	-2.64	0.008	-.0888285	-.0130561
satv	.0011809	.0001463	8.07	0.000	.0008941	.0014677
satm	-.0019622	.0001425	-13.77	0.000	-.0022415	-.0016828
citz						
1	-.0872404	.0435893	-2.00	0.045	-.1726737	-.001807
2	.3359391	.0101799	33.00	0.000	.3159869	.3558913
ethnic2						
1	-.1640517	.0386336	-4.25	0.000	-.2397721	-.0883312
2	-.0768556	.1011832	-0.76	0.448	-.275171	.1214598
3	-.0754466	.0556906	-1.35	0.175	-.1845981	.033705
4	.0144965	.1040364	0.14	0.889	-.1894111	.2184041
5	-.0643578	.0827569	-0.78	0.437	-.2265584	.0978428
6	.0435107	.034752	1.25	0.211	-.024602	.1116234
1.gender2	.0818755	.0198682	4.12	0.000	.0429346	.1208164
year3						
5	.3201954	.0289991	11.04	0.000	.2633583	.3770326
6	-.2058357	.1295716	-1.59	0.112	-.4597913	.0481198
7	-.0179798	.0468977	-0.38	0.701	-.1098977	.0739381
8	-.0476137	.0423783	-1.12	0.261	-.1306735	.0354462
9	.0244863	.0428928	0.57	0.568	-.059582	.1085546
10	-.0731566	.0409531	-1.79	0.074	-.1534232	.0071099
12	-.0907393	.0416266	-2.18	0.029	-.172326	-.0091527
13	-.0258484	.040905	-0.63	0.527	-.1060208	.054324
14	.003339	.0397064	0.08	0.933	-.0744842	.0811621
15	-.0202125	.0401057	-0.50	0.614	-.0988182	.0583931
16	.0473263	.039189	1.21	0.227	-.0294828	.1241354
17	-.0426791	.056508	-0.76	0.450	-.1534328	.0680745
18	.0795791	.093807	0.85	0.396	-.1042793	.2634375
19	.3201964	.0286907	11.16	0.000	.2639637	.3764291
fygpa	-.0067802	.0213685	-0.32	0.751	-.0486618	.0351013

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

The average marginal effects of *rdr*, *satv*, and *satm* are all significant at the 5% significance level, as are *finaid*, *citz*1, *gender2*, and Asian ethnicity. The years that were significant at the 10% level (ignoring years 5 and 19) are years 10 and 12. Below, we interpret these effects:

- The coefficient for *rdr* is 0.0873833, which tells us that with a one unit increase in reader rating, there is an approximately 8.7% increase in the probability that a student will become a non-Mathematics, non-Science, non-Economics major on average. This is an interesting result that we will discuss at greater length later.
- The coefficient for *satv* is 0.0011809, which indicates that a 10 point increase in verbal SAT score is correlated, on average, with a 1% greater probability of being an "other" major. The *satm* coefficient is -0.0019622, indicating that a 10 point increase in SAT math scores is correlated with an approximately 2% lower probability of being an "other" major. This is in accordance with our initial hypotheses as those who are more mathematically oriented are more likely to become Math, Science or Economics majors as these are the majors that involve more quantitative skills.
- Financial aid status has a coefficient of -0.0509423, telling us that on average, students on financial aid are 5% less likely to be non-Mathematics, non-Science, non-Economics majors at Reed college, which is also in accordance with our initial expectations that more privileged socioeconomic backgrounds often produce students who are less driven by "practical" or "economic" motivation when choosing their majors.
- The *citz*1 coefficient (-0.0872404) indicates that, on average, foreigners are nearly 9% less likely to major in the social sciences or the arts, confirming our initial expectation that foreigners tend to major in Math, Science, or Economics.
- Similarly, students of Asian descent are about 16% less likely to major in the "other" category on average (the marginal effect is -0.1640517).
- Being female increases the probability of majoring in the "other" category by about 8% (the coefficient is 0.0818755) on average.

- Finally, the two years that are significant at the 10% level of significance (1995 and 1997) both have negative coefficients indicating a decrease in probability of becoming an "other" major during these years by 7% and 9% respectively (-0.0731566 and -.0907393). We are unsure of the reasons for this.

Marginal Effects at Means for the "Math and Science" Major Category

```
. margins,dydx(rdr fygpa satv satm finaid citz gender2 ethnic2 year3) predict(ou
> ome(2)) atmeans

Conditional marginal effects                    Number of obs   =       2254
Model VCE    : OIM
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	-.1070089	.1450107	-0.74	0.461	-.3912246	.1772068
1.finaid	.0480728	.1230224	0.39	0.696	-.1930467	.2891922
satv	-.0012736	.0022039	-0.58	0.563	-.0055932	.0030459
satm	.0021375	.0035895	0.60	0.552	-.0048978	.0091728
citz						
1	.0776929	.2905553	0.27	0.789	-.4917851	.6471708
2	-.2808852	.5290425	-0.53	0.595	-1.31779	.7560191
ethnic2						
1	.1618318	.3669237	0.44	0.659	-.5573253	.880989
2	.1126294	4.153168	0.03	0.978	-8.027429	8.252688
3	.079841	.1402402	0.57	0.569	-.1950249	.3547068
4	.0079394	.1682804	0.05	0.962	-.3218842	.3377629
5	.0441881	.2260469	0.20	0.845	-.3988555	.4872318
6	-.0376834	.0919939	-0.41	0.682	-.2179881	.1426212
1.gender2	-.0750485	.2077893	-0.36	0.718	-.4823081	.332211
year3						
5	-.2598668	.3777176	-0.69	0.491	-1.00018	.480446
6	.2099888	.5789174	0.36	0.717	-.9246685	1.344646
7	.0229175	.0545545	0.42	0.674	-.0840074	.1298424
8	.059832	.0650113	0.92	0.357	-.0675878	.1872517
9	-.0302727	.0534126	-0.57	0.571	-.1349594	.0744141
10	.0866666	.0876868	0.99	0.323	-.0851965	.2585296
12	.119772	.0991894	1.21	0.227	-.0746357	.3141796
13	.0331606	.0521921	0.64	0.525	-.0691341	.1354552
14	.0073774	.0764647	0.10	0.923	-.1424907	.1572455
15	.0215403	.0528781	0.41	0.684	-.0820988	.1251795
16	-.0510074	.0745362	-0.68	0.494	-.1970958	.0950809
17	.0342199	.1412548	0.24	0.809	-.2426345	.3110743
18	-.0587343	2.91477	-0.02	0.984	-5.771579	5.65411
19	-.2598673	.3777118	-0.69	0.491	-1.000169	.4804342
fygpa	.01285	.040651	0.32	0.752	-.0668245	.0925244

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

As with the regression at the means for non-Economics, non-Mathematics, non-Science majors, this regression is extremely uninformative, with no statistically significant results, and therefore we proceed to the average marginal effects.

Average Marginal Effects for the "Math and Science" Major category:

```
. margins,dydx(rdr fygpa satv satm finaid citz gender2 ethnic2 year3) predict(out
> ome(2))

Average marginal effects                        Number of obs   =       2254
Model VCE    : OIM
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	-.0964132	.0215638	-4.47	0.000	-.1386775	-.0541488
1.finaid	.0394004	.0190955	2.06	0.039	.0019738	.0768269
satv	-.001095	.0001443	-7.59	0.000	-.0013779	-.0008122
satm	.0018451	.0001423	12.97	0.000	.0015662	.002124
citz						
1	.0597462	.0422376	1.41	0.157	-.023038	.1425304
2	-.3089141	.0099462	-31.06	0.000	-.3284083	-.2894199
ethnic2						
1	.1333236	.0384212	3.47	0.001	.0580194	.2086279
2	.1039941	.1011654	1.03	0.304	-.0942865	.3022747
3	.0687618	.055375	1.24	0.214	-.0397712	.1772949
4	.012642	.1406021	0.09	0.928	-.262933	.288217
5	.0331706	.0806472	0.41	0.681	-.1248951	.1912363
6	-.0324554	.0344321	-0.94	0.346	-.099941	.0350303
1.gender2	-.0623926	.0195763	-3.19	0.001	-.1007614	-.0240237
year3						
5	-.2868795	.0284421	-10.09	0.000	-.342625	-.2311341
6	.168723	.132587	1.27	0.203	-.0911427	.4285886
7	.0211448	.0460141	0.46	0.646	-.0690412	.1113307
8	.054166	.0420236	1.29	0.197	-.0281987	.1365306
9	-.0283985	.0419705	-0.68	0.499	-.1106592	.0538621
10	.0762003	.0405666	1.88	0.060	-.0033087	.1557094
12	.1079914	.0412759	2.62	0.009	.0270921	.1888907
13	.0305231	.0403481	0.76	0.449	-.0485576	.1096039
14	.0098836	.0391218	0.25	0.801	-.0667937	.086561
15	.0187909	.0394335	0.48	0.634	-.0584974	.0960793
16	-.0466356	.0382244	-1.22	0.222	-.121554	.0282828
17	.0262402	.0562286	0.47	0.641	-.0839657	.1364462
18	-.0462631	.0940993	-0.49	0.623	-.2306943	.1381681
19	-.2868804	.0281689	-10.18	0.000	-.3420905	-.2316703
fygpa	.0129622	.0211411	0.61	0.540	-.0284735	.054398

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

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```

- Where reader rating was positively correlated with the probability of becoming an "Other" major, it is negatively correlated with the probability of becoming a Mathematics or Natural Science major; it has a coefficient of -0.0964132, telling us that when reader rating increases by one unit, the probability of becoming a Math or Science major falls by approximately 10% on average. This seems to indicate that the skill sets that it takes to impress readers are those required in more quantitative majors.
- Similarly, the coefficient for verbal SAT scores here is slightly negative (-0.001095) where that for "Other" category of major is positive, indicating, again, a declining probability of becoming a Math or Science major as demonstrated verbal skills increase (approximately 1% less probable with a 10 point increase in verbal SAT score). The coefficient for Math SAT scores is positive (0.0018451) – although higher demonstrated verbal skills make a student less likely to become a Math or Science major, higher demonstrated Math skills make them more likely to become a Math or Science major.
- The coefficient for Financial Aid here is positive (0.0394004), unlike that for non-quantitative majors; students with Financial Aid are 4% more likely to become Mathematics or Science majors than students without Financial Aid, supporting our theory that less privileged backgrounds make students more likely to pursue "practical" options.
- Ethnicity 1 has a coefficient of 0.1333236, indicating that people of Asian descent are 13% more likely to be Math or Science majors than Caucasians, a finding consistent with the fact that Asians are less likely than Caucasians to pick a major in category 1. This is the only statistically significant result for ethnicity, which suggests that either there are no strong trends among people of non-Asian ethnic groups, or that there are insufficient observations to give us a representative indication of the trends among Hispanic people, Black people, and Native Americans.
- Once again, gender is highly significant, and it is negative for Math and Science majors, with a coefficient of -0.0623926, indicating that women are 6% less likely than men to major in Math or a Science.

- As with the “Other” category, years 10 and 12 are statistically significant from year 11, here with positive coefficients of 0.0762003 and 0.1079914 respectively, telling us that people were substantially more likely to become Math and Science majors in 1995 and 1997 than they were in 1996. Again, we are unsure of the reasons for this.

Marginal Effects at Means for "Economics" Majors

```
. margins,dydx(rdr fygpa satv satm finaid citz gender2 ethnic2 year3) predict(ou
> ome(3)) atmeans

Conditional marginal effects                      Number of obs   =       2254
Model VCE    : OIM
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.0041832	.1457599	0.03	0.977	-.281501	.2898674
1.finaid	.0073049	.2545486	0.03	0.977	-.4916012	.506211
satv	-.0000641	.0022349	-0.03	0.977	-.0044445	.0043163
satm	.0000916	.0031965	0.03	0.977	-.0061734	.0063567
citz						
1	.0183576	.6203663	0.03	0.976	-1.197538	1.234253
2	-.0158042	.5529953	-0.03	0.977	-1.099655	1.068047
ethnic2						
1	.0270826	.5629424	0.05	0.962	-1.076264	1.130429
2	-.0203127	.4423596	-0.05	0.963	-.8873216	.8466961
3	.0061359	.1314575	0.05	0.963	-.2515161	.2637879
4	-.0203127	.4423595	-0.05	0.963	-.8873215	.8466961
5	.0256238	.5332257	0.05	0.962	-1.019479	1.070727
6	-.0086786	.1869604	-0.05	0.963	-.3751143	.3577571
1.gender2	-.0129694	.4506737	-0.03	0.977	-.8962736	.8703349
year3						
5	-.0215133	.6089951	-0.04	0.972	-1.215122	1.172095
6	.0307544	.8262836	0.04	0.970	-1.588732	1.650241
7	-.0018229	.052142	-0.03	0.972	-.1040194	.1003736
8	-.0037108	.1037263	-0.04	0.971	-.2070106	.199589
9	.0021234	.0598766	0.04	0.972	-.1152325	.1194793
10	-.0009879	.0296619	-0.03	0.973	-.0591242	.0571484
12	-.0106252	.2975315	-0.04	0.972	-.5937763	.5725258
13	-.0027226	.0763246	-0.04	0.972	-.1523161	.1468709
14	-.0087085	.2434667	-0.04	0.971	-.4858944	.4684774
15	.0012905	.0374669	0.03	0.973	-.0721432	.0747242
16	-.0012842	.0373897	-0.03	0.973	-.0745667	.0719983
17	.0120442	.3299374	0.04	0.971	-.6346213	.6587097
18	-.0215133	.6089959	-0.04	0.972	-1.215123	1.172097
19	-.0215133	.6089959	-0.04	0.972	-1.215123	1.172097
fygpa	-.003505	.1221591	-0.03	0.977	-.2429324	.2359225

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

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```

Nothing is statistically significant; this regression is completely uninformative.

Average Marginal Effects for "Economics" Major

```
. margins,dydx(rdr fygpa satv satm finaid citz gender2 ethnic2 year3) predict(ou
> ome(3))

Average marginal effects                        Number of obs   =       2254
Model VCE    : OIM
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.0090299	.0084573	1.07	0.286	-.0075462	.0256059
1.finaid	.0115419	.0075073	1.54	0.124	-.0031722	.0262561
satv	-.0000859	.0000535	-1.60	0.109	-.0001907	.000019
satm	.0001171	.0000568	2.06	0.039	5.82e-06	.0002283
citz						
1	.0274942	.0199493	1.38	0.168	-.0116058	.0665941
2	-.027025	.0039648	-6.82	0.000	-.034796	-.0192541
ethnic2						
1	.0307281	.0187868	1.64	0.102	-.0060934	.0675495
2	-.0271385	.0040572	-6.69	0.000	-.0350905	-.0191865
3	.0066847	.0204054	0.33	0.743	-.0333091	.0466785
4	-.0271385	.0040573	-6.69	0.000	-.0350906	-.0191864
5	.0311872	.0407243	0.77	0.444	-.0486309	.1110053
6	-.0110553	.0101931	-1.08	0.278	-.0310334	.0089228
1.gender2	-.019483	.0075476	-2.58	0.010	-.034276	-.00469
year3						
5	-.0333159	.011738	-2.84	0.005	-.0563219	-.0103099
6	.0371128	.067655	0.55	0.583	-.0954886	.1697142
7	-.003165	.0188716	-0.17	0.867	-.0401526	.0338227
8	-.0065523	.016555	-0.40	0.692	-.0389995	.025895
9	.0039122	.0180314	0.22	0.828	-.0314287	.0392531
10	-.0030437	.0161539	-0.19	0.851	-.0347047	.0286173
12	-.0172521	.0141082	-1.22	0.221	-.0449036	.0103994
13	-.0046747	.0157715	-0.30	0.767	-.0355864	.0262369
14	-.0132226	.0146305	-0.90	0.366	-.0418979	.0154527
15	.0014216	.0167321	0.08	0.932	-.0313727	.0342158
16	-.0006907	.016911	-0.04	0.967	-.0338356	.0324543
17	.0164389	.0298867	0.55	0.582	-.0421379	.0750156
18	-.033316	.0116352	-2.86	0.004	-.0561205	-.0105115
19	-.033316	.0116378	-2.86	0.004	-.0561256	-.0105064
fygpa	-.006182	.0080013	-0.77	0.440	-.0218643	.0095003

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

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```

The only statistically significant coefficients here other than those for variables already established as having negligible observations are the coefficients for *satm*, which is tiny (0.0001171), ethnicity 2 – Black, for which there are 2 observations, and ethnicity 4 – Native American, for which there are 0 observations. Therefore we can safely ignore the marginal effects for Economics majors.

Alternative Regressions

Model 1: taking out citizenship

major2	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1	(base outcome)					
2						
rdr	-.5341202	.1220979	-4.37	0.000	-.7734277	-.2948126
1.finaid	.2506965	.1067709	2.35	0.019	.0414293	.4599636
satv	-.0066543	.000834	-7.98	0.000	-.0082889	-.0050197
satm	.0108244	.0008894	12.17	0.000	.0090811	.0125676
ethnic2						
1	.8701901	.1836712	4.74	0.000	.5102012	1.230179
2	.5642375	.5010153	1.13	0.260	-.4177345	1.54621
3	.4609749	.2817679	1.64	0.102	-.0912799	1.01323
4	.0078663	.5751599	0.01	0.989	-1.119426	1.135159
5	.2948338	.4280316	0.69	0.491	-.5440928	1.13376
6	-.1909942	.2038078	-0.94	0.349	-.5904502	.2084618
1.gender2	-.3934212	.1069527	-3.68	0.000	-.6030448	-.1837977
year3						
5	-11.27179	1383.752	-0.01	0.994	-2723.376	2700.832
6	.9743315	.6570466	1.48	0.138	-.3134563	2.262119
7	.0828691	.2585001	0.32	0.749	-.4237818	.5895201
8	.271727	.2315365	1.17	0.241	-.1820762	.7255303
9	-.1649203	.2508857	-0.66	0.511	-.6566473	.3268068
10	.4115134	.2223371	1.85	0.064	-.0242594	.8472861
12	.5308372	.22318	2.38	0.017	.0934124	.968262
13	.1480708	.2274747	0.65	0.515	-.2977713	.5939129
14	.003205	.2243923	0.01	0.989	-.4365958	.4430057
15	.1020614	.2243531	0.45	0.649	-.3376626	.5417853
16	-.3213228	.2318429	-1.39	0.166	-.7757265	.1330809
17	.1669677	.3103101	0.54	0.591	-.4412289	.7751642
18	-.40955	.6032101	-0.68	0.497	-1.59182	.7727202
19	-13.16858	1383.752	-0.01	0.992	-2725.273	2698.935
fygpa	.0732769	.1173204	0.62	0.532	-.156667	.3032207
_cons	-2.221246	.9986164	-2.22	0.026	-4.178498	-.2639942

3						
rdr	**.1166277**	**.3064361**	**0.38**	**0.704**	**−.483976**	**.7172314**
1.finaid	**.535355**	**.2782486**	**1.92**	**0.054**	**−.0100023**	**1.080712**
satv	**−.0066058**	**.0019448**	**−3.40**	**0.001**	**−.0104177**	**−.002794**
satm	**.0088623**	**.0021405**	**4.14**	**0.000**	**.0046671**	**.0130576**
ethnic2						
1	**1.4117**	**.3573996**	**3.95**	**0.000**	**.7112101**	**2.112191**
2	**−12.65296**	**774.9669**	**−0.02**	**0.987**	**−1531.56**	**1506.254**
3	**.4666827**	**.6505973**	**0.72**	**0.473**	**−.8084646**	**1.74183**
4	**−12.59357**	**888.9566**	**−0.01**	**0.989**	**−1754.917**	**1729.729**
5	**1.457703**	**.6726755**	**2.17**	**0.030**	**.1392834**	**2.776123**
6	**−.5491515**	**.6171855**	**−0.89**	**0.374**	**−1.758813**	**.6605098**
1.gender2	**−.9552876**	**.2919888**	**−3.27**	**0.001**	**−1.527575**	**−.3830001**
year3						
5	**−11.2816**	**4455.518**	**−0.00**	**0.998**	**−8743.937**	**8721.374**
6	**1.174267**	**1.170929**	**1.00**	**0.316**	**−1.120712**	**3.469246**
7	**.0925349**	**.606642**	**0.15**	**0.879**	**−1.096462**	**1.281531**
8	**−.0395632**	**.5683625**	**−0.07**	**0.945**	**−1.153533**	**1.074407**
9	**.0670224**	**.549927**	**0.12**	**0.903**	**−1.010815**	**1.14486**
10	**.0357937**	**.5453623**	**0.07**	**0.948**	**−1.033097**	**1.104684**
12	**−.5815961**	**.6371232**	**−0.91**	**0.361**	**−1.830335**	**.6671424**
13	**−.161787**	**.5465397**	**−0.30**	**0.767**	**−1.232985**	**.9094111**
14	**−.617498**	**.5935154**	**−1.04**	**0.298**	**−1.780767**	**.5457708**
15	**.0583036**	**.5285324**	**0.11**	**0.912**	**−.9776009**	**1.094208**
16	**−.2347565**	**.5481312**	**−0.43**	**0.668**	**−1.309074**	**.8395609**
17	**.4247435**	**.7175995**	**0.59**	**0.554**	**−.9817257**	**1.831213**
18	**−13.13356**	**729.3444**	**−0.02**	**0.986**	**−1442.622**	**1416.355**
19	**−12.76327**	**4455.518**	**−0.00**	**0.998**	**−8745.419**	**8719.892**
fygpa	**−.0710573**	**.2886356**	**−0.25**	**0.806**	**−.6367728**	**.4946581**
_cons	**−4.406735**	**2.432932**	**−1.81**	**0.070**	**−9.175195**	**.361724**

.

Marginal Effects

Marginal Effects at Means for "Other" Major

```
. margins, dydx(rdr fygpa satv satm finaid gender2 ethnic2 year3) predict(outcome
> 1)) atmeans

Conditional marginal effects                    Number of obs   =       2266
Model VCE    : OIM
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.1044951	.0793036	1.32	0.188	-.050937	.2599272
1.finaid	-.0560263	.0622968	-0.90	0.368	-.1781257	.0660731
satv	.0014023	.0006241	2.25	0.025	.0001791	.0026255
satm	-.0022576	.00085	-2.66	0.008	-.0039235	-.0005917
ethnic2						
1	-.2158621	.1132281	-1.91	0.057	-.437785	.0060609
2	-.1099909	.162983	-0.67	0.500	-.4294318	.20945
3	-.1029787	.0721369	-1.43	0.153	-.2443644	.0384071
4	.0132958	.1538175	0.09	0.931	-.2881809	.3147724
5	-.0978236	.2433042	-0.40	0.688	-.5746911	.379044
6	.0416333	.0533549	0.78	0.435	-.0629405	.146207
1.gender2	.0901776	.1127196	0.80	0.424	-.1307487	.311104
year3						
5	.2855594	.1709851	1.67	0.095	-.0495652	.620684
6	-.2332386	.1757697	-1.33	0.185	-.577741	.1112638
7	-.0173703	.0528825	-0.33	0.743	-.1210181	.0862776
8	-.0535101	.0567412	-0.94	0.346	-.1647208	.0577005
9	.0284112	.0542768	0.52	0.601	-.0779693	.1347918
10	-.084611	.0574134	-1.47	0.141	-.1971391	.0279171
12	-.1055437	.1107378	-0.95	0.341	-.3225857	.1114984
13	-.0263918	.0582988	-0.45	0.651	-.1406553	.0878716
14	.0071577	.0875407	0.08	0.935	-.1644189	.1787344
15	-.0205237	.0453079	-0.45	0.651	-.1093255	.0682781
16	.0595543	.0442886	1.34	0.179	-.0272498	.1463584
17	-.0404449	.088404	-0.46	0.647	-.2137135	.1328238
18	.0896314	.1937989	0.46	0.644	-.2902075	.4694702
19	.2855637	.1708594	1.67	0.095	-.0493145	.6204419
fygpa	-.0136495	.0300115	-0.45	0.649	-.0724708	.0451719

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

SAT scores – both verbal and math – become significant at the means in this regression where they were not significant in the original regression. This could be because SAT scores are related to foreign status (foreigners perhaps do worse on the verbal component

of the SAT exam). The verbal and math coefficients at the means are 0.0014023 and -0.0022576 respectively. Ethnicity 1 (Asian) becomes significant at the 10% level.

Average Marginal Effects for "Other" Major

```
. margins, dydx(rdr fygpa satv satm finaid gender2 ethnic2 year3) predict(outcome
> 1))

Average marginal effects                        Number of obs   =       2266
Model VCE    : OIM
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.0886845	.0218769	4.05	0.000	.0458066	.1315624
1.finaid	-.0513379	.0192719	-2.66	0.008	-.0891102	-.0135657
satv	.0012381	.0001436	8.62	0.000	.0009567	.0015194
satm	-.0019828	.0001416	-14.00	0.000	-.0022604	-.0017052
ethnic2						
1	-.1873924	.0369063	-5.08	0.000	-.2597274	-.1150573
2	-.0921918	.1012646	-0.91	0.363	-.2906668	.1062833
3	-.0900385	.0553897	-1.63	0.104	-.1986003	.0185233
4	.0150362	.1037184	0.14	0.885	-.1882482	.2183206
5	-.091155	.0814773	-1.12	0.263	-.2508475	.0685376
6	.0389514	.0347092	1.12	0.262	-.0290774	.1069801
1.gender2	.0837256	.0198259	4.22	0.000	.0448675	.1225837
year3						
5	.323254	.0311397	10.38	0.000	.2622213	.3842867
6	-.1983371	.1297374	-1.53	0.126	-.4526177	.0559436
7	-.0154676	.0463869	-0.33	0.739	-.1063842	.075449
8	-.045535	.0422023	-1.08	0.281	-.12825	.03718
9	.0245609	.0429967	0.57	0.568	-.0597111	.1088329
10	-.0718391	.0409626	-1.75	0.079	-.1521243	.0084461
12	-.0873368	.0416318	-2.10	0.036	-.1689336	-.00574
13	-.0220104	.0408543	-0.54	0.590	-.1020833	.0580625
14	.0087136	.0395943	0.22	0.826	-.0688897	.0863169
15	-.0179921	.0401213	-0.45	0.654	-.0966284	.0606443
16	.0542818	.0389959	1.39	0.164	-.0221488	.1307123
17	-.0370065	.0563853	-0.66	0.512	-.1475195	.0735066
18	.0881783	.093101	0.95	0.344	-.0942963	.2706529
19	.3232617	.0287759	11.23	0.000	.2668619	.3796615
fygpa	-.0112569	.0212342	-0.53	0.596	-.0528751	.0303613

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

.
```

When we take out citizenship, the only notable change is that in this model people of Asian descent are approximately 19% less likely (with a coefficient of -0.1873924) than Caucasians to become “Other” majors, whereas in the original model, they were approximately 16% less likely.

Marginal Effects at Means for “Math and Science” Major

```
. margins, dydx(rdr fygpa satv satm finaid gender2 ethnic2 year3) predict(outcome
> 2)) atmeans

Conditional marginal effects                    Number of obs   =       2266
Model VCE    : OIM
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	-.1092527	.048117	-2.27	0.023	-.2035603	-.0149452
1.finaid	.0480294	.0472937	1.02	0.310	-.0446645	.1407234
satv	-.0013202	.0007751	-1.70	0.089	-.0028393	.0001989
satm	.0021571	.0011635	1.85	0.064	-.0001232	.0044374
ethnic2						
1	.1778352	.1569611	1.13	0.257	-.1298029	.4854733
2	.1304616	.1313062	0.99	0.320	-.1268938	.3878171
3	.0955316	.0778882	1.23	0.220	-.0571265	.2481898
4	.0071749	.1210974	0.06	0.953	-.2301716	.2445214
5	.0424468	.155409	0.27	0.785	-.2621494	.3470429
6	-.0336751	.043381	-0.78	0.438	-.1187003	.0513501
1.gender2	-.074928	.0795666	-0.94	0.346	-.2308756	.0810197
year3						
5	-.2622021	.0693777	-3.78	0.000	-.3981799	-.1262244
6	.2056905	.2362916	0.87	0.384	-.2574326	.6688136
7	.0157287	.0512266	0.31	0.759	-.0846736	.1161309
8	.0560978	.0473865	1.18	0.236	-.036778	.1489736
9	-.0310236	.0458447	-0.68	0.499	-.1208775	.0588303
10	.0866269	.0480089	1.80	0.071	-.0074688	.1807226
12	.1177732	.0510913	2.31	0.021	.0176362	.2179102
13	.0306149	.0454104	0.67	0.500	-.0583878	.1196176
14	.0034771	.0512834	0.07	0.946	-.0970364	.1039907
15	.0198327	.0444056	0.45	0.655	-.0672007	.106866
16	-.0562067	.0457529	-1.23	0.219	-.1458808	.0334674
17	.0301061	.0727939	0.41	0.679	-.1125674	.1727795
18	-.0662737	.1146136	-0.58	0.563	-.2909123	.1583649
19	-.2622061	.0690827	-3.80	0.000	-.3976058	-.1268064
fygpa	.0152681	.0244473	0.62	0.532	-.0326477	.0631839

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

At the means, reader rating becomes significant, with a coefficient of -0.1092527. Both SAT score coefficients become significant at the 10% level; the coefficients for math and verbal are 0.0021571 and -0.0013202 respectively. These coefficients are almost the same as the coefficients for these variables in the original model.

Average Marginal Effects for "Math and science" Major

```
. margins, dydx(rdr fygpa satv satm finaid gender2 ethnic2 year3) predict(outcome
> 2))

Average marginal effects                        Number of obs   =       2266
Model VCE    : OIM
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	-.0983025	.021486	-4.58	0.000	-.1404142	-.0561908
1.finaid	.0393034	.0190198	2.07	0.039	.0020253	.0765815
satv	-.0011295	.0001415	-7.98	0.000	-.0014069	-.000852
satm	.0018595	.0001415	13.14	0.000	.0015821	.0021369
ethnic2						
1	.1450549	.0367566	3.95	0.000	.0730134	.2170964
2	.1187739	.1012456	1.17	0.241	-.0796638	.3172115
3	.0820923	.0551268	1.49	0.136	-.0259543	.1901389
4	.0115459	.1037007	0.11	0.911	-.1917038	.2147955
5	.0262412	.0787327	0.33	0.739	-.1280719	.1805544
6	-.0290864	.0343654	-0.85	0.397	-.0964412	.0382685
1.gender2	-.062067	.0195059	-3.18	0.001	-.100298	-.0238361
year3						
5	-.2883383	.0303299	-9.51	0.000	-.3477838	-.2288929
6	.1663858	.1323015	1.26	0.209	-.0929204	.4256919
7	.0134926	.0453779	0.30	0.766	-.0754464	.1024317
8	.050285	.0417739	1.20	0.229	-.0315903	.1321604
9	-.0290966	.0420361	-0.69	0.489	-.1114858	.0532926
10	.0762732	.0405964	1.88	0.060	-.0032943	.1558406
12	.1063336	.041262	2.58	0.010	.0254617	.1872056
13	.0286464	.0403083	0.71	0.477	-.0503563	.1076491
14	.006834	.0389954	0.18	0.861	-.0695956	.0832637
15	.017448	.0394446	0.44	0.658	-.059862	.094758
16	-.0507321	.0380076	-1.33	0.182	-.1252256	.0237613
17	.023341	.0560111	0.42	0.677	-.0864388	.1331207
18	-.0532617	.0929413	-0.57	0.567	-.2354233	.1288999
19	-.2883452	.0282338	-10.21	0.000	-.3436825	-.2330079
fygpa	.0141369	.0209744	0.67	0.500	-.026972	.0552459

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

.
```

As with the "Other" major, the only notable effect here is that when we take out citizenship, the average marginal effect of being of Asian descent has a larger coefficient; the coefficient is 0.1450549, telling us that in this model, people of Asian descent are 14.5% more likely to become Math or Science majors than Caucasians, whereas in the other model, they are only 13% more likely.

Marginal Effects at Means for "Economics" Major

```
. margins, dydx(rdr fygpa satv satm finaid gender2 ethnic2 year3) predict(outcome
> 3)) atmeans

Conditional marginal effects                    Number of obs   =       2266
Model VCE    : OIM
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.0047574	.0564821	0.08	0.933	-.1059455	.1154602
1.finaid	.0079969	.0946756	0.08	0.933	-.177564	.1935577
satv	-.0000821	.0009719	-0.08	0.933	-.0019869	.0018227
satm	.0001005	.0011901	0.08	0.933	-.002232	.002433
ethnic2						
1	.0380269	.2468517	0.15	0.878	-.4457935	.5218472
2	-.0204707	.1407281	-0.15	0.884	-.2962926	.2553513
3	.0074471	.052716	0.14	0.888	-.0958743	.1107685
4	-.0204707	.140728	-0.15	0.884	-.2962924	.2553511
5	.0553768	.3540433	0.16	0.876	-.6385353	.7492889
6	-.0079582	.0545967	-0.15	0.884	-.1149657	.0990494
1.gender2	-.0152497	.1797835	-0.08	0.932	-.3676187	.3371194
year3						
5	-.0233573	.229525	-0.10	0.919	-.473218	.4265034
6	.0275481	.2615697	0.11	0.916	-.485119	.5402153
7	.0016416	.0211831	0.08	0.938	-.0398765	.0431597
8	-.0025877	.0276297	-0.09	0.925	-.0567409	.0515656
9	.0026124	.0282052	0.09	0.926	-.0526688	.0578936
10	-.0020159	.0226415	-0.09	0.929	-.0463925	.0423607
12	-.0122295	.1191512	-0.10	0.918	-.2457616	.2213025
13	-.0042231	.0421667	-0.10	0.920	-.0868684	.0784222
14	-.0106349	.1035719	-0.10	0.918	-.2136321	.1923624
15	.000691	.0137582	0.05	0.960	-.0262746	.0276566
16	-.0033476	.0341803	-0.10	0.922	-.0703398	.0636446
17	.0103388	.1003157	0.10	0.918	-.1862765	.206954
18	-.0233577	.2295212	-0.10	0.919	-.473211	.4264957
19	-.0233576	.2295212	-0.10	0.919	-.4732109	.4264957
fygpa	-.0016185	.0197715	-0.08	0.935	-.04037	.037133

Marginal effects at the means are not notably different than in the original regression.

Average Marginal Effects for "Economics" Major

```
. margins, dydx(rdr fygpa satv satm finaid gender2 ethnic2 year3) predict(outcome(3))

Average marginal effects                        Number of obs   =       2266
Model VCE    : OIM
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.009618	.0085244	1.13	0.259	-.0070896	.0263256
1.finaid	.0120345	.0075454	1.59	0.111	-.0027541	.0268232
satv	-.0001086	.0000534	-2.03	0.042	-.0002133	-3.92e-06
satm	.0001233	.0000569	2.17	0.030	.0000118	.0002348
ethnic2						
1	.0423375	.019549	2.17	0.030	.0040221	.0806528
2	-.0265821	.0038732	-6.86	0.000	-.0341735	-.0189907
3	.0079462	.0206671	0.38	0.701	-.0325605	.0484529
4	-.0265821	.0038738	-6.86	0.000	-.0341745	-.0189897
5	.0649137	.0502389	1.29	0.196	-.0335527	.1633802
6	-.009865	.0104434	-0.94	0.345	-.0303337	.0106037
1.gender2	-.0216585	.0075912	-2.85	0.004	-.036537	-.00678
year3						
5	-.0349157	.0128546	-2.72	0.007	-.0601101	-.0097212
6	.0319513	.0646453	0.49	0.621	-.0947511	.1586537
7	.001975	.0201857	0.10	0.922	-.0375883	.0415382
8	-.00475	.0170658	-0.28	0.781	-.0381984	.0286984
9	.0045357	.0188921	0.24	0.810	-.0324922	.0415636
10	-.0044341	.0165263	-0.27	0.788	-.0368251	.0279569
12	-.0189968	.0144141	-1.32	0.188	-.0472479	.0092543
13	-.006636	.0160163	-0.41	0.679	-.0380274	.0247554
14	-.0155477	.0147542	-1.05	0.292	-.0444654	.0133701
15	.0005441	.0171795	0.03	0.975	-.0331272	.0342153
16	-.0035496	.0167898	-0.21	0.833	-.0364569	.0293577
17	.0136655	.0295519	0.46	0.644	-.0442552	.0715862
18	-.0349166	.0120556	-2.90	0.004	-.058545	-.0112882
19	-.0349165	.012098	-2.89	0.004	-.058628	-.0112049
fygpa	-.0028801	.0080668	-0.36	0.721	-.0186906	.0129305

The average marginal effect of ethnicity 1 (Asian) becomes significant in this regression, with a coefficient of 0.0423375. When we take out citizenship, then, we see that people of Asian descent are 4% more likely to become Economics majors than Caucasians. SAT verbal scores also become significant, but the coefficient is not very different.

Alternative Model 2: Taking out citizenship and replacing fygpa with fygpahours

major2	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1	(base outcome)					
2						
rdr	**-.543042**	**.1159444**	**-4.68**	**0.000**	**-.770289**	**-.3157951**
satv	**-.006614**	**.00083**	**-7.97**	**0.000**	**-.0082407**	**-.0049873**
satm	**.010745**	**.0008919**	**12.05**	**0.000**	**.0089969**	**.0124932**
ethnic2						
1	**.86576**	**.1838642**	**4.71**	**0.000**	**.5053927**	**1.226127**
2	**.5394135**	**.4989233**	**1.08**	**0.280**	**-.4384583**	**1.517285**
3	**.4522925**	**.2816984**	**1.61**	**0.108**	**-.0998263**	**1.004411**
4	**-.0194738**	**.5734168**	**-0.03**	**0.973**	**-1.14335**	**1.104402**
5	**.283225**	**.4270353**	**0.66**	**0.507**	**-.5537489**	**1.120199**
6	**-.1859932**	**.2040545**	**-0.91**	**0.362**	**-.5859326**	**.2139463**
1.finaid	**.2517539**	**.1068032**	**2.36**	**0.018**	**.0424235**	**.4610842**
1.gender2	**-.3980134**	**.1070152**	**-3.72**	**0.000**	**-.6077594**	**-.1882675**
fygpahours	**.0803454**	**.0581071**	**1.38**	**0.167**	**-.0335424**	**.1942332**
year3						
5	**-10.9984**	**1383.752**	**-0.01**	**0.994**	**-2723.102**	**2701.106**
6	**.9570674**	**.653812**	**1.46**	**0.143**	**-.3243805**	**2.238515**
7	**.0684093**	**.2584143**	**0.26**	**0.791**	**-.4380734**	**.574892**
8	**.2832063**	**.2316753**	**1.22**	**0.222**	**-.1708689**	**.7372816**
9	**-.1537167**	**.250877**	**-0.61**	**0.540**	**-.6454265**	**.3379932**
10	**.4155431**	**.2222252**	**1.87**	**0.061**	**-.0200103**	**.8510966**
12	**.5292856**	**.223165**	**2.37**	**0.018**	**.0918902**	**.966681**
13	**.1375802**	**.2274614**	**0.60**	**0.545**	**-.3082359**	**.5833962**
14	**-.0108338**	**.2244324**	**-0.05**	**0.961**	**-.4507131**	**.4290455**
15	**.0888543**	**.224297**	**0.40**	**0.692**	**-.3507597**	**.5284683**
16	**-.3271241**	**.2316984**	**-1.41**	**0.158**	**-.7812447**	**.1269964**
17	**.1811302**	**.3103393**	**0.58**	**0.559**	**-.4271236**	**.789384**
18	**-.4083325**	**.6044447**	**-0.68**	**0.499**	**-1.593022**	**.7763572**
19	**-13.2035**	**1383.752**	**-0.01**	**0.992**	**-2725.307**	**2698.9**
_cons	**-2.555041**	**1.0108**	**-2.53**	**0.011**	**-4.536172**	**-.5739092**

3						
rdr	**.1280937**	**.294621**	**0.43**	**0.664**	**−.4493528**	**.7055402**
satv	**−.0066163**	**.0019409**	**−3.41**	**0.001**	**−.0104205**	**−.0028121**
satm	**.0089421**	**.0021404**	**4.18**	**0.000**	**.0047469**	**.0131373**
ethnic2						
1	**1.420356**	**.3581565**	**3.97**	**0.000**	**.7183825**	**2.12233**
2	**−12.62887**	**775.5374**	**−0.02**	**0.987**	**−1532.654**	**1507.397**
3	**.4958315**	**.6491089**	**0.76**	**0.445**	**−.7763985**	**1.768062**
4	**−12.58824**	**886.7003**	**−0.01**	**0.989**	**−1750.489**	**1725.312**
5	**1.473288**	**.6732815**	**2.19**	**0.029**	**.15368**	**2.792895**
6	**−.556183**	**.6175335**	**−0.90**	**0.368**	**−1.766526**	**.6541605**
1.finaid	**.5400167**	**.2782558**	**1.94**	**0.052**	**−.0053547**	**1.085388**
1.gender2	**−.9541191**	**.2915667**	**−3.27**	**0.001**	**−1.525579**	**−.3826588**
fygpahours	**−.0735276**	**.137916**	**−0.53**	**0.594**	**−.3438381**	**.1967828**
year3						
5	**−11.5118**	**4455.518**	**−0.00**	**0.998**	**−8744.167**	**8721.144**
6	**1.174446**	**1.172683**	**1.00**	**0.317**	**−1.123972**	**3.472863**
7	**.1238304**	**.6069099**	**0.20**	**0.838**	**−1.065691**	**1.313352**
8	**−.0471456**	**.5687804**	**−0.08**	**0.934**	**−1.161935**	**1.067644**
9	**.0672184**	**.5486249**	**0.12**	**0.902**	**−1.008067**	**1.142503**
10	**.0369298**	**.5449599**	**0.07**	**0.946**	**−1.031172**	**1.105032**
12	**−.5749667**	**.6370751**	**−0.90**	**0.367**	**−1.823611**	**.6736775**
13	**−.156186**	**.5471805**	**−0.29**	**0.775**	**−1.22864**	**.9162681**
14	**−.5929632**	**.5936886**	**−1.00**	**0.318**	**−1.756571**	**.570645**
15	**.0763238**	**.5285042**	**0.14**	**0.885**	**−.9595254**	**1.112173**
16	**−.2178478**	**.54775**	**−0.40**	**0.691**	**−1.291418**	**.8557225**
17	**.422057**	**.7173089**	**0.59**	**0.556**	**−.9838426**	**1.827957**
18	**−13.15754**	**721.4025**	**−0.02**	**0.985**	**−1427.08**	**1400.765**
19	**−12.71323**	**4455.518**	**−0.00**	**0.998**	**−8745.369**	**8719.942**
_cons	**−4.157613**	**2.426009**	**−1.71**	**0.087**	**−8.912504**	**.5972782**

.

Marginal Effects

There is no noteworthy difference between the significant coefficients here and those in the regression with fygpa rather than fygpahours.

Marginal Effects at Means for "Other" Major

```
. margins, dydx(rdr fygpahours satv satm finaid gender2 ethnic2 year3) predict(outcome(1)) atmeans

Conditional marginal effects                    Number of obs   =       2266
Model VCE    : OIM
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.1061291	.0808899	1.31	0.190	-.0524122	.2646704
1.finaid	-.056266	.0624823	-0.90	0.368	-.1787291	.0661971
satv	.0013942	.0006234	2.24	0.025	.0001724	.002616
satm	-.0022425	.000852	-2.63	0.008	-.0039123	-.0005727
ethnic2						
1	-.2150698	.1139934	-1.89	0.059	-.4384928	.0083532
2	-.1041586	.1609514	-0.65	0.518	-.4196176	.2113004
3	-.1015628	.0727461	-1.40	0.163	-.2441426	.0410169
4	.0186359	.1514478	0.12	0.902	-.2781963	.3154681
5	-.0961687	.2464293	-0.39	0.696	-.5791612	.3868239
6	.0407926	.0533966	0.76	0.445	-.0638627	.145448
1.gender2	.0910249	.1114787	0.82	0.414	-.1274692	.3095191
year3						
5	.2858012	.1688009	1.69	0.090	-.0450424	.6166449
6	-.2293467	.1765109	-1.30	0.194	-.5753016	.1166082
7	-.01513	.0540606	-0.28	0.780	-.1210869	.0908269
8	-.0559239	.0577391	-0.97	0.333	-.1690904	.0572426
9	.0265437	.0538058	0.49	0.622	-.0789138	.1320012
10	-.085631	.0573558	-1.49	0.135	-.1980463	.0267843
12	-.1054574	.1091051	-0.97	0.334	-.3192996	.1083848
13	-.0244307	.0570813	-0.43	0.669	-.136308	.0874465
14	.0095141	.0841512	0.11	0.910	-.1554192	.1744473
15	-.0182638	.0454177	-0.40	0.688	-.1072809	.0707532
16	.0602704	.0435055	1.39	0.166	-.0249989	.1455396
17	-.0431374	.0864086	-0.50	0.618	-.2124951	.1262204
18	.0893039	.1919943	0.47	0.642	-.2869979	.4656058
19	.2858069	.1685851	1.70	0.090	-.0446139	.6162277
fygpahours	-.0150244	.0222713	-0.67	0.500	-.0586754	.0286267

Average Marginal Effects for "Other" Major

```
. margins, dydx(rdr fygpahours satv satm finaid gender2 ethnic2 year3) predict(outcome(1))

Average marginal effects                        Number of obs   =       2266
Model VCE    : OIM
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.0899366	.0207295	4.34	0.000	.0493074	.1305657
1.finaid	-.0515694	.019262	-2.68	0.007	-.0893222	-.0138165
satv	.0012307	.0001428	8.62	0.000	.0009509	.0015106
satm	-.0019695	.0001423	-13.84	0.000	-.0022484	-.0016906
ethnic2						
1	-.1867634	.0369224	-5.06	0.000	-.2591299	-.1143968
2	-.0871231	.1004771	-0.87	0.386	-.2840546	.1098085
3	-.0889143	.055312	-1.61	0.108	-.1973238	.0194952
4	.019931	.1025211	0.19	0.846	-.1810067	.2208687
5	-.0899756	.0812808	-1.11	0.268	-.2492831	.0693319
6	.038187	.0347723	1.10	0.272	-.0299655	.1063396
1.gender2	.0844717	.0198233	4.26	0.000	.0456187	.1233247
year3						
5	.3236059	.0324639	9.97	0.000	.2599779	.3872339
6	-.1951335	.1292003	-1.51	0.131	-.4483615	.0580945
7	-.0137071	.0463033	-0.30	0.767	-.1044599	.0770457
8	-.0474858	.042263	-1.12	0.261	-.1303198	.0353482
9	.0228803	.0430506	0.53	0.595	-.0614974	.1072579
10	-.0726208	.0409445	-1.77	0.076	-.1528706	.0076289
12	-.087171	.0416162	-2.09	0.036	-.1687372	-.0056048
13	-.0203269	.0408031	-0.50	0.618	-.1002995	.0596458
14	.0107281	.0395314	0.27	0.786	-.066752	.0882082
15	-.0161369	.0400632	-0.40	0.687	-.0946594	.0623855
16	.0548121	.0389423	1.41	0.159	-.0215134	.1311375
17	-.0392359	.056465	-0.69	0.487	-.1499052	.0714335
18	.0878288	.0933415	0.94	0.347	-.0951171	.2707747
19	.323616	.028721	11.27	0.000	.2673238	.3799081
fygpahours	-.0124033	.0104641	-1.19	0.236	-.0329125	.0081059

Marginal Effects at Means for "Math and Science" Major

```
. margins, dydx(rdr fygpahours satv satm finaid gender2 ethnic2 year3) predict(outcome(2)) atmeans

Conditional marginal effects                    Number of obs   =       2266
Model VCE    : OIM
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	-.1111136	.0480267	-2.31	0.021	-.2052441	-.016983
1.finaid	.0482248	.0473416	1.02	0.308	-.044563	.1410127
satv	-.001312	.0007696	-1.70	0.088	-.0028203	.0001964
satm	.0021405	.001157	1.85	0.064	-.0001271	.0044082
ethnic2						
1	.1766541	.1562794	1.13	0.258	-.1296479	.482956
2	.1245161	.1298359	0.96	0.338	-.1299575	.3789897
3	.0932693	.0780846	1.19	0.232	-.0597738	.2463123
4	.0017216	.1192625	0.01	0.988	-.2320285	.2354717
5	.0397067	.1547417	0.26	0.797	-.2635815	.342995
6	-.0327775	.0433004	-0.76	0.449	-.1176448	.0520898
1.gender2	-.075882	.0792705	-0.96	0.338	-.2312494	.0794854
year3						
5	-.2627414	.0689727	-3.81	0.000	-.3979254	-.1275573
6	.2017421	.2339275	0.86	0.388	-.2567474	.6602316
7	.0126431	.051332	0.25	0.805	-.0879658	.113252
8	.0587084	.0475701	1.23	0.217	-.0345272	.151944
9	-.0290637	.0460444	-0.63	0.528	-.1193091	.0611817
10	.0876324	.0480732	1.82	0.068	-.0065893	.1818541
12	.1174572	.0509748	2.30	0.021	.0175484	.217366
13	.02844	.0453554	0.63	0.531	-.060455	.117335
14	.0006313	.0507433	0.01	0.990	-.0988237	.1000862
15	.0170714	.0444321	0.38	0.701	-.0700139	.1041566
16	-.0573214	.0453883	-1.26	0.207	-.1462809	.0316381
17	.0331528	.0730645	0.45	0.650	-.1100509	.1763565
18	-.0662438	.1145651	-0.58	0.563	-.2907873	.1582996
19	-.2627469	.0684514	-3.84	0.000	-.3969091	-.1285846
fygpahours	.0167157	.0134642	1.24	0.214	-.0096736	.0431051

Average Marginal Effects for "Math and science" Major

```
. margins, dydx(rdr fygpahours satv satm finaid gender2 ethnic2 year3) predict(outcome(2))

Average marginal effects                        Number of obs   =       2266
Model VCE    : OIM
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	-.0999651	.0203517	-4.91	0.000	-.1398537	-.0600765
1.finaid	.0394194	.0190077	2.07	0.038	.0021651	.0766738
satv	-.0011212	.0001408	-7.96	0.000	-.0013971	-.0008453
satm	.0018427	.0001422	12.96	0.000	.0015641	.0021214
ethnic2						
1	.1438155	.0367773	3.91	0.000	.0717334	.2158976
2	.1136467	.1004581	1.13	0.258	-.0832475	.310541
3	.0798761	.0549805	1.45	0.146	-.0278837	.1876359
4	.0065926	.1025034	0.06	0.949	-.1943102	.2074955
5	.0235987	.0781876	0.30	0.763	-.1296462	.1768435
6	-.0282013	.0344432	-0.82	0.413	-.0957086	.0393061
1.gender2	-.0628976	.019503	-3.23	0.001	-.1011228	-.0246725
year3						
5	-.289026	.0318097	-9.09	0.000	-.3513719	-.2266802
6	.1628495	.1313009	1.24	0.215	-.0944955	.4201946
7	.0104539	.0452332	0.23	0.817	-.0782016	.0991094
8	.0525428	.0418552	1.26	0.209	-.0294919	.1345774
9	-.0272244	.0421224	-0.65	0.518	-.1097828	.055334
10	.0770244	.0405844	1.90	0.058	-.0025196	.1565684
12	.1058638	.0412524	2.57	0.010	.0250106	.186717
13	.0266268	.0402423	0.66	0.508	-.0522467	.1055004
14	.0041037	.0389124	0.11	0.916	-.0721631	.0803705
15	.0148124	.0393509	0.38	0.707	-.0623139	.0919387
16	-.0518471	.0379344	-1.37	0.172	-.1261972	.022503
17	.0260781	.0561563	0.46	0.642	-.0839862	.1361424
18	-.0532483	.0931819	-0.57	0.568	-.2358814	.1293849
19	-.2890356	.0281788	-10.26	0.000	-.344265	-.2338062
fygpahours	.0154334	.0103693	1.49	0.137	-.0048901	.0357569

Marginal Effects at Means for "Economics" Major

```
. margins, dydx(rdr fygpahours satv satm finaid gender2 ethnic2 year3) predict(outcome(3)) atmeans

Conditional marginal effects                    Number of obs   =       2266
Model VCE    : OIM
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.0049842	.0589372	0.08	0.933	-.1105306	.1204991
1.finaid	.0080412	.0948817	0.08	0.932	-.1779236	.1940059
satv	-.0000822	.0009696	-0.08	0.932	-.0019826	.0018182
satm	.0001019	.0012029	0.08	0.932	-.0022557	.0024596
ethnic2						
1	.0384157	.2470566	0.16	0.876	-.4458064	.5226378
2	-.0203575	.1386859	-0.15	0.883	-.2921768	.2514618
3	.0082935	.0576788	0.14	0.886	-.1047549	.121342
4	-.0203575	.1386858	-0.15	0.883	-.2921766	.2514616
5	.0564619	.3573443	0.16	0.874	-.6439201	.7568439
6	-.0080151	.0544879	-0.15	0.883	-.1148095	.0987792
1.gender2	-.0151429	.17794	-0.09	0.932	-.3638988	.333613
year3						
5	-.0230599	.2265098	-0.10	0.919	-.467011	.4208912
6	.0276046	.2620178	0.11	0.916	-.4859408	.5411501
7	.002487	.0277703	0.09	0.929	-.0519418	.0569157
8	-.0027845	.0292619	-0.10	0.924	-.0601367	.0545677
9	.00252	.0273261	0.09	0.927	-.0510382	.0560782
10	-.0020014	.0224389	-0.09	0.929	-.0459809	.0419781
12	-.0119998	.1168821	-0.10	0.918	-.2410844	.2170849
13	-.0040093	.0401506	-0.10	0.920	-.082703	.0746844
14	-.0101453	.0987902	-0.10	0.918	-.2037705	.1834799
15	.0011925	.0165889	0.07	0.943	-.0313211	.0337061
16	-.002949	.0305607	-0.10	0.923	-.0628468	.0569488
17	.0099846	.096983	0.10	0.918	-.1800986	.2000677
18	-.0230601	.226508	-0.10	0.919	-.4670076	.4208874
19	-.0230601	.2265079	-0.10	0.919	-.4670075	.4208873
fygpahours	-.0016912	.0200646	-0.08	0.933	-.0410171	.0376347

Average Marginal Effects for "Economics" Major

```
. margins, dydx(rdr fygpahours satv satm finaid gender2 ethnic2 year3) predict(outcome(3))

Average marginal effects                        Number of obs   =       2266
Model VCE    : OIM
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.0100286	.008199	1.22	0.221	-.0060412	.0260983
1.finaid	.0121499	.0075384	1.61	0.107	-.002625	.0269248
satv	-.0001095	.0000533	-2.05	0.040	-.000214	-5.01e-06
satm	.0001267	.000057	2.22	0.026	.000015	.0002385
ethnic2						
1	.0429479	.0197138	2.18	0.029	.0043095	.0815863
2	-.0265237	.0038638	-6.86	0.000	-.0340965	-.0189508
3	.0090382	.0211644	0.43	0.669	-.0324434	.0505197
4	-.0265236	.0038643	-6.86	0.000	-.0340975	-.0189498
5	.0663769	.0508724	1.30	0.192	-.0333311	.166085
6	-.0099858	.0103489	-0.96	0.335	-.0302693	.0102977
1.gender2	-.0215741	.0075715	-2.85	0.004	-.0364139	-.0067342
year3						
5	-.0345798	.012429	-2.78	0.005	-.0589402	-.0102194
6	.032284	.0646102	0.50	0.617	-.0943497	.1589177
7	.0032532	.0204321	0.16	0.873	-.036793	.0432994
8	-.005057	.0168169	-0.30	0.764	-.0380175	.0279036
9	.0043442	.0186324	0.23	0.816	-.0321747	.0408631
10	-.0044036	.0163499	-0.27	0.788	-.0364488	.0276417
12	-.0186929	.0142982	-1.31	0.191	-.0467169	.0093312
13	-.0063	.0159441	-0.40	0.693	-.0375498	.0249499
14	-.0148318	.0147469	-1.01	0.315	-.0437353	.0140716
15	.0013245	.0171957	0.08	0.939	-.0323785	.0350276
16	-.0029649	.01675	-0.18	0.859	-.0357943	.0298644
17	.0131578	.0291008	0.45	0.651	-.0438787	.0701943
18	-.0345805	.0119245	-2.90	0.004	-.0579521	-.0112089
19	-.0345804	.0119709	-2.89	0.004	-.0580429	-.0111179
fygpahours	-.0030301	.0038602	-0.78	0.432	-.0105961	.0045358

Model 3: Taking out rdr

major2	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
1	(base outcome)					
2						
1.finaid	.3643691	.1032127	3.53	0.000	.1620759	.5666624
satv	-.0054992	.0008144	-6.75	0.000	-.0070955	-.0039029
satm	.0115984	.000863	13.44	0.000	.0099069	.0132899
citz						
1	.4614859	.2168103	2.13	0.033	.0365455	.8864264
2	-13.90977	3983.045	-0.00	0.997	-7820.534	7792.715
ethnic2						
1	.7852417	.1900962	4.13	0.000	.4126601	1.157823
2	.5692176	.5004142	1.14	0.255	-.4115761	1.550011
3	.4012061	.2858877	1.40	0.161	-.1591234	.9615356
4	.0221278	.5696039	0.04	0.969	-1.094275	1.138531
5	.3062481	.4270011	0.72	0.473	-.5306587	1.143155
6	-.1989292	.2001537	-0.99	0.320	-.5912232	.1933647
1.gender2	-.3344461	.104971	-3.19	0.001	-.5401855	-.1287066
year3						
5	-13.37414	3983.045	-0.00	0.997	-7819.998	7793.25
6	.9013651	.6534106	1.38	0.168	-.3792962	2.182026
7	.2623698	.2562254	1.02	0.306	-.2398229	.7645624
8	.3402625	.2301344	1.48	0.139	-.1107926	.7913176
9	-.0862735	.2485213	-0.35	0.728	-.5733662	.4008192
10	.407443	.2210019	1.84	0.065	-.0257128	.8405988
12	.5398905	.2205801	2.45	0.014	.1075615	.9722195
13	.1495911	.2250131	0.66	0.506	-.2914265	.5906088
14	.0505331	.2234911	0.23	0.821	-.3875015	.4885676
15	.1239158	.2221079	0.56	0.577	-.3114077	.5592393
16	-.24891	.230661	-1.08	0.281	-.7009972	.2031773
17	.2314737	.3096372	0.75	0.455	-.3754041	.8383515
18	-.3417724	.5950156	-0.57	0.566	-1.507981	.8244367
19	-14.62713	3983.045	-0.00	0.997	-7821.251	7791.997
fygpa	.2346248	.1111531	2.11	0.035	.0167687	.452481
_cons	-5.588602	.6735182	-8.30	0.000	-6.908674	-4.268531

3						
1.finaid	**.4945521**	**.2723243**	**1.82**	**0.069**	**−.0391938**	**1.028298**
satv	**−.0058262**	**.0019583**	**−2.98**	**0.003**	**−.0096644**	**−.001988**
satm	**.0086631**	**.0021265**	**4.07**	**0.000**	**.0044953**	**.0128309**
citz						
1	**.9124752**	**.4322894**	**2.11**	**0.035**	**.0652036**	**1.759747**
2	**−12.97371**	**13045.47**	**−0.00**	**0.999**	**−25581.63**	**25555.68**
ethnic2						
1	**1.163119**	**.3931339**	**2.96**	**0.003**	**.3925907**	**1.933647**
2	**−14.85369**	**2110.278**	**−0.01**	**0.994**	**−4150.924**	**4121.216**
3	**.4349963**	**.6535406**	**0.67**	**0.506**	**−.8459197**	**1.715912**
4	**−14.7457**	**2547.579**	**−0.01**	**0.995**	**−5007.909**	**4978.418**
5	**.9236282**	**.8004672**	**1.15**	**0.249**	**−.6452587**	**2.492515**
6	**−.6182392**	**.6190166**	**−1.00**	**0.318**	**−1.83149**	**.5950111**
1.gender2	**−.9044832**	**.2921211**	**−3.10**	**0.002**	**−1.47703**	**−.3319364**
year3						
5	**−13.39704**	**13045.47**	**−0.00**	**0.999**	**−25582.05**	**25555.26**
6	**1.305251**	**1.173686**	**1.11**	**0.266**	**−.9951301**	**3.605633**
7	**−.0921217**	**.6440624**	**−0.14**	**0.886**	**−1.354461**	**1.170217**
8	**−.1055219**	**.5994875**	**−0.18**	**0.860**	**−1.280496**	**1.069452**
9	**.0496389**	**.5509992**	**0.09**	**0.928**	**−1.0303**	**1.129577**
10	**.0788187**	**.5472392**	**0.14**	**0.885**	**−.9937505**	**1.151388**
12	**−.5098369**	**.6390632**	**−0.80**	**0.425**	**−1.762378**	**.742704**
13	**−.1162905**	**.5491637**	**−0.21**	**0.832**	**−1.192632**	**.9600507**
14	**−.5288814**	**.5965811**	**−0.89**	**0.375**	**−1.698159**	**.6403962**
15	**.0602355**	**.5311965**	**0.11**	**0.910**	**−.9808905**	**1.101361**
16	**−.1492022**	**.5528294**	**−0.27**	**0.787**	**−1.232728**	**.9343235**
17	**.5021839**	**.7179858**	**0.70**	**0.484**	**−.9050423**	**1.90941**
18	**−15.19313**	**2245.787**	**−0.01**	**0.995**	**−4416.855**	**4386.468**
19	**−15.36997**	**13045.47**	**−0.00**	**0.999**	**−25584.03**	**25553.29**
fygpa	**−.2226544**	**.2783516**	**−0.80**	**0.424**	**−.7682134**	**.3229047**
_cons	**−4.093138**	**1.700072**	**−2.41**	**0.016**	**−7.425217**	**−.7610588**

Marginal Effects:

Marginal Effects at Means for "Other" Major

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
year3						
5	.2777459	.5629437	0.49	0.622	-.8256035	1.381095
6	-.2182024	.4028137	-0.54	0.588	-1.007703	.5712978
7	-.0503374	.1176508	-0.43	0.669	-.2809286	.1802538
8	-.0666249	.1378665	-0.48	0.629	-.3368383	.2035884
9	.0147873	.0657345	0.22	0.822	-.11405	.1436246
10	-.0834158	.1018507	-0.82	0.413	-.2830395	.116208
12	-.1073839	.2750217	-0.39	0.696	-.6464165	.4316487
13	-.0270706	.0954997	-0.28	0.777	-.2142467	.1601054
14	-.0031428	.1963245	-0.02	0.987	-.3879318	.3816461
15	-.0245096	.0482111	-0.51	0.611	-.1190016	.0699824
16	.0456354	.0585458	0.78	0.436	-.0691122	.160383
17	-.0540164	.2024385	-0.27	0.790	-.4507884	.3427557
18	.0765266	.4709868	0.16	0.871	-.8465906	.9996437
19	.2777463	.5629409	0.49	0.622	-.8255975	1.38109
ethnic2						
1	-.1906427	.2502155	-0.76	0.446	-.6810561	.2997708
2	-.112081	2.479254	-0.05	0.964	-4.971329	4.747167
3	-.0897018	.118667	-0.76	0.450	-.3222849	.1428812
4	.0101463	.3384987	0.03	0.976	-.653299	.6735916
5	-.0803398	.3271474	-0.25	0.806	-.7215369	.5608573
6	.0438358	.1370331	0.32	0.749	-.2247441	.3124157
1.gender2	.0772261	.2964033	0.26	0.794	-.5037136	.6581658
1.finaid	-.0776095	.1413528	-0.55	0.583	-.3546559	.1994368
satv	.0011632	.0016777	0.69	0.488	-.0021251	.0044515
satm	-.002412	.0029363	-0.82	0.411	-.0081671	.0033431
citz						
1	-.1114378	.3110816	-0.36	0.720	-.7211465	.4982709
2	.2972133	.629773	0.47	0.637	-.9371191	1.531546
fygpa	-.0442557	.1603344	-0.28	0.783	-.3585054	.2699939

As in the original model, none of the coefficients for our variables are significant here.

Average Marginal Effects for "Other" Major

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
year3						
5	.315451	.0287244	10.98	0.000	.2591521	.3717498
6	-.1893662	.130324	-1.45	0.146	-.4447965	.0660642
7	-.0432059	.0471002	-0.92	0.359	-.1355205	.0491087
8	-.0570282	.0422819	-1.35	0.177	-.1398993	.0258428
9	.012803	.0430001	0.30	0.766	-.0714756	.0970817
10	-.0719412	.0407926	-1.76	0.078	-.1518933	.008011
12	-.0902441	.0412438	-2.19	0.029	-.1710805	-.0094077
13	-.0230835	.0404184	-0.57	0.568	-.1023021	.0561351
14	-.0006208	.0396371	-0.02	0.988	-.0783082	.0770666
15	-.0216828	.0397934	-0.54	0.586	-.0996764	.0563109
16	.0416938	.0390994	1.07	0.286	-.0349396	.1183273
17	-.0494712	.0567515	-0.87	0.383	-.160702	.0617597
18	.0765918	.0934123	0.82	0.412	-.106493	.2596765
19	.3154517	.0284695	11.08	0.000	.2596525	.371251
ethnic2						
1	-.1662649	.0385697	-4.31	0.000	-.2418602	-.0906697
2	-.0945523	.1022179	-0.93	0.355	-.2948957	.1057911
3	-.0791485	.0562005	-1.41	0.159	-.1892994	.0310025
4	.0122905	.1043585	0.12	0.906	-.1922485	.2168294
5	-.0733701	.0828323	-0.89	0.376	-.2357184	.0889783
6	.041282	.034395	1.20	0.230	-.026131	.108695
1.gender2	.0727142	.0196397	3.70	0.000	.0342211	.1112074
1.finaid	-.0702811	.0186694	-3.76	0.000	-.1068724	-.0336898
satv	.0010366	.0001437	7.21	0.000	.000755	.0013183
satm	-.0021292	.0001346	-15.82	0.000	-.002393	-.0018653
citz						
1	-.1001464	.0433143	-2.31	0.021	-.1850409	-.0152519
2	.3348432	.0099198	33.75	0.000	.3154007	.3542856
fygpa	-.0367966	.020226	-1.82	0.069	-.0764388	.0028455

Freshman year GPA becomes significant at the 10% level here with a coefficient of -0.0367966. As Freshman year GPA increases by 1 point, the probability that someone will become an "Other" major decreases by 3.7%.

Marginal Effects at Means for "Math and science" Major

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
year3						
5	-.2560721	.3730164	-0.69	0.492	-.9871708	.4750265
6	.1840827	.5860449	0.31	0.753	-.9645441	1.33271
7	.0536224	.0662323	0.81	0.418	-.0761905	.1834354
8	.0705946	.07017	1.01	0.314	-.0669362	.2081253
9	-.0163567	.0479513	-0.34	0.733	-.1103395	.0776262
10	.0843468	.0870553	0.97	0.333	-.0862784	.254972
12	.117976	.0985123	1.20	0.231	-.0751045	.3110565
13	.0301732	.0506777	0.60	0.552	-.0691533	.1294998
14	.0121006	.0766406	0.16	0.875	-.1381122	.1623134
15	.0239451	.0512536	0.47	0.640	-.0765102	.1244004
16	-.0438109	.0698594	-0.63	0.531	-.1807329	.0931111
17	.0425563	.1457844	0.29	0.770	-.2431759	.3282885
18	-.0548528	1.227934	-0.04	0.964	-2.461558	2.351853
19	-.2560725	.373011	-0.69	0.492	-.9871607	.4750157
ethnic2						
1	.1636082	.3669078	0.45	0.656	-.5555178	.8827342
2	.1322753	.2149935	0.62	0.538	-.2891042	.5536548
3	.0826476	.1465376	0.56	0.573	-.2045608	.369856
4	.010048	.167899	0.06	0.952	-.3190279	.3391239
5	.0554446	.2345535	0.24	0.813	-.4042718	.5151609
6	-.0351975	.0883455	-0.40	0.690	-.2083516	.1379566
1.gender2	-.063844	.1997072	-0.32	0.749	-.4552629	.3275749
1.finaid	.0714463	.142856	0.50	0.617	-.2085463	.3514388
satv	-.0010953	.0019735	-0.55	0.579	-.0049632	.0027727
satm	.0023269	.0037849	0.61	0.539	-.0050913	.0097452
citz						
1	.0942877	.2990481	0.32	0.753	-.4918358	.6804111
2	-.2815593	.5263254	-0.53	0.593	-1.313138	.7500194
fygpa	.0489299	.0703128	0.70	0.486	-.0888807	.1867406

Again, none of the coefficients for our variables are significant at the means for this major category.

Average Marginal Effects for "Math and science" Major

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
year3						
5	-.2816819	.0281092	-10.02	0.000	-.336775	-.2265887
6	.147618	.1319148	1.12	0.263	-.1109302	.4061663
7	.0491354	.0464371	1.06	0.290	-.0418797	.1401506
8	.0642283	.041959	1.53	0.126	-.0180099	.1464665
9	-.0155604	.042152	-0.37	0.712	-.0981768	.067056
10	.0749799	.0403519	1.86	0.063	-.0041083	.1540682
12	.1076199	.0408474	2.63	0.008	.0275605	.1876793
13	.0283299	.039815	0.71	0.477	-.049706	.1063658
14	.0143837	.0390343	0.37	0.713	-.0621222	.0908896
15	.0213969	.0390955	0.55	0.584	-.0552289	.0980227
16	-.0400281	.038167	-1.05	0.294	-.1148341	.0347778
17	.0340368	.0566723	0.60	0.548	-.0770389	.1451125
18	-.0428225	.0934414	-0.46	0.647	-.2259644	.1403193
19	-.2816825	.027877	-10.10	0.000	-.3363204	-.2270447
ethnic2						
1	.1358259	.0384599	3.53	0.000	.0604459	.2112058
2	.1214802	.1022012	1.19	0.235	-.0788304	.3217908
3	.0714238	.0560471	1.27	0.203	-.0384265	.181274
4	.0146374	.1195798	0.12	0.903	-.2197347	.2490095
5	.0433926	.0811246	0.53	0.593	-.1156087	.202394
6	-.0302784	.034088	-0.89	0.374	-.0970897	.036533
1.gender2	-.0524099	.0193607	-2.71	0.007	-.0903561	-.0144637
1.finaid	.0610537	.0184607	3.31	0.001	.0248713	.0972361
satv	-.0009409	.0001419	-6.63	0.000	-.001219	-.0006629
satm	.002027	.0001348	15.04	0.000	.0017629	.0022911
citz						
1	.0747134	.0423183	1.77	0.077	-.0082288	.1576557
2	-.3079019	.0096596	-31.88	0.000	-.3268343	-.2889695
fygpa	.0456707	.0200425	2.28	0.023	.0063881	.0849533

Citizenship becomes significant at the 10% level. The coefficient for financial aid increases from 0.0394 in the original regression to 0.0610537 in the regression without reader rating. This suggests that reader rating is somewhat collinear with the financial aid variable – a "better" reader rating was probably correlated to some degree with being on Financial Aid, and therefore being on Financial Aid is correlated to some degree with

being a more demonstrably capable student, serving as another explanation for why students on Financial Aid are more likely to become Math or Science majors.

Marginal Effects at Means for "Economics" Major

	Delta-method					
	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
year3						
5	-.0216738	.6217354	-0.03	0.972	-1.240253	1.196905
6	.0341197	.9250571	0.04	0.971	-1.778959	1.847198
7	-.003285	.0932427	-0.04	0.972	-.1860375	.1794674
8	-.0039696	.1123572	-0.04	0.972	-.2241857	.2162465
9	.0015693	.0455386	0.03	0.973	-.0876847	.0908234
10	-.000931	.0285544	-0.03	0.974	-.0568965	.0550345
12	-.010592	.3005071	-0.04	0.972	-.5995751	.578391
13	-.0031026	.0879442	-0.04	0.972	-.17547	.1692648
14	-.0089578	.253788	-0.04	0.972	-.5063732	.4884576
15	.0005645	.0194474	0.03	0.977	-.0375517	.0386807
16	-.0018245	.0525033	-0.03	0.972	-.1047291	.1010801
17	.01146	.3183145	0.04	0.971	-.6124249	.635345
18	-.0216738	.6217362	-0.03	0.972	-1.240254	1.196907
19	-.0216738	.6217362	-0.03	0.972	-1.240254	1.196907
ethnic2						
1	.0270345	.560524	0.05	0.962	-1.071572	1.125641
2	-.0201943	.4385871	-0.05	0.963	-.8798092	.8394206
3	.0070542	.1503137	0.05	0.963	-.2875551	.3016636
4	-.0201943	.4385871	-0.05	0.963	-.8798091	.8394206
5	.0248953	.5172325	0.05	0.962	-.9888618	1.038652
6	-.0086383	.185598	-0.05	0.963	-.3724036	.355127
1.gender2	-.0133821	.468671	-0.03	0.977	-.9319605	.9051962
1.finaid	.0061633	.2166114	0.03	0.977	-.4183873	.4307139
satv	-.000068	.0023884	-0.03	0.977	-.0047491	.0046132
satm	.0000851	.0029924	0.03	0.977	-.0057799	.0059501
citz						
1	.0171501	.5852177	0.03	0.977	-1.129856	1.164156
2	-.015654	.5522469	-0.03	0.977	-1.098038	1.06673
fygpa	-.0046737	.164133	-0.03	0.977	-.3263685	.3170211

Average Marginal Effects for "Economics" Major

	Delta-method					
	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
year3						
5	-.0337691	.0118745	-2.84	0.004	-.0570427	-.0104955
6	.0417482	.0718412	0.58	0.561	-.0990579	.1825543
7	-.0059295	.0179804	-0.33	0.742	-.0411704	.0293114
8	-.0072	.0165979	-0.43	0.664	-.0397313	.0253312
9	.0027574	.0179011	0.15	0.878	-.0323281	.0378429
10	-.0030388	.0163641	-0.19	0.853	-.0351118	.0290342
12	-.0173758	.0143242	-1.21	0.225	-.0454508	.0106992
13	-.0052464	.0158773	-0.33	0.741	-.0363654	.0258726
14	-.0137629	.0147111	-0.94	0.350	-.0425962	.0150703
15	.0002859	.016664	0.02	0.986	-.032375	.0329467
16	-.0016657	.0168565	-0.10	0.921	-.0347038	.0313724
17	.0154344	.0296839	0.52	0.603	-.042745	.0736137
18	-.0337692	.011769	-2.87	0.004	-.0568361	-.0107023
19	-.0337692	.0117711	-2.87	0.004	-.0568401	-.0106983
ethnic2						
1	.0304391	.0185329	1.64	0.101	-.0058848	.0667629
2	-.0269279	.0040257	-6.69	0.000	-.0348181	-.0190376
3	.0077247	.020807	0.37	0.710	-.0330562	.0485057
4	-.0269279	.0040258	-6.69	0.000	-.0348182	-.0190375
5	.0299774	.0397654	0.75	0.451	-.0479613	.1079162
6	-.0110037	.0100935	-1.09	0.276	-.0307866	.0087792
1.gender2	-.0203043	.0074351	-2.73	0.006	-.0348768	-.0057319
1.finaid	.0092274	.0071338	1.29	0.196	-.0047546	.0232095
satv	-.0000957	.0000526	-1.82	0.069	-.0001988	7.37e-06
satm	.0001022	.0000537	1.90	0.057	-3.11e-06	.0002075
citz						
1	.025433	.0191868	1.33	0.185	-.0121725	.0630384
2	-.0269413	.0040011	-6.73	0.000	-.0347833	-.0190993
fygpa	-.0088739	.0075854	-1.17	0.242	-.0237411	.0059933

SAT math scores lose significance slightly in this regression, and SAT verbal scores gain significance. There are no other prominent differences from the original regression evidenced in these marginal effects.

Model 4: including *fygpa_hum* and *fygpahours*

For this regression, we decided to use robust standard errors to account for the collinearity between *fygpa* and *fygpa_hum*, which was hinted at in our original VIF table. To do this we used the command `vce(bootstrap)` as an "option" following our `mlogit` command.

major2	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
1	(base outcome)					
2						
rdr	**-.5247282**	**.1271449**	**-4.13**	**0.000**	**-.7739276**	**-.2755287**
1.finaid	**.2331162**	**.089711**	**2.60**	**0.009**	**.0572859**	**.4089466**
satv	**-.0058107**	**.0006393**	**-9.09**	**0.000**	**-.0070637**	**-.0045578**
satm	**.0101324**	**.0008322**	**12.18**	**0.000**	**.0085014**	**.0117634**
citz						
1	**.3915803**	**.1417388**	**2.76**	**0.006**	**.1137774**	**.6693832**
2	**-11.55938**	**.6514465**	**-17.74**	**0.000**	**-12.83619**	**-10.28257**
ethnic2						
1	**.7582795**	**.2066398**	**3.67**	**0.000**	**.3532729**	**1.163286**
2	**.5114421**	**.5973611**	**0.86**	**0.392**	**-.6593641**	**1.682248**
3	**.41668**	**.3637851**	**1.15**	**0.252**	**-.2963258**	**1.129686**
4	**.0504892**	**.5985871**	**0.08**	**0.933**	**-1.12272**	**1.223698**
5	**.1949926**	**.4946863**	**0.39**	**0.693**	**-.7745746**	**1.16456**
6	**-.2138605**	**.2047515**	**-1.04**	**0.296**	**-.615166**	**.187445**
1.gender2	**-.3704436**	**.0729455**	**-5.08**	**0.000**	**-.5134141**	**-.2274731**
year3						
5	**-10.88652**	**.8658306**	**-12.57**	**0.000**	**-12.58352**	**-9.189527**
6	**.932737**	**.9129908**	**1.02**	**0.307**	**-.8566921**	**2.722166**
7	**.0101204**	**.1984813**	**0.05**	**0.959**	**-.3788957**	**.3991366**
8	**.2623536**	**.3030198**	**0.87**	**0.387**	**-.3315543**	**.8562616**
9	**-.190866**	**.2721976**	**-0.70**	**0.483**	**-.7243635**	**.3426314**
10	**.3953301**	**.3054917**	**1.29**	**0.196**	**-.2034226**	**.9940829**
12	**.4932188**	**.2319467**	**2.13**	**0.033**	**.0386116**	**.9478259**
13	**.1111594**	**.2170832**	**0.51**	**0.609**	**-.314316**	**.5366347**
14	**.010276**	**.1691373**	**0.06**	**0.952**	**-.3212269**	**.341779**
15	**.0907895**	**.2628097**	**0.35**	**0.730**	**-.4243079**	**.605887**
16	**-.3406571**	**.2442217**	**-1.39**	**0.163**	**-.8193228**	**.1380086**
17	**.1490164**	**.2110884**	**0.71**	**0.480**	**-.2647092**	**.562742**
18	**-.3475359**	**3.910158**	**-0.09**	**0.929**	**-8.011305**	**7.316233**
19	**-13.45299**	**.7272354**	**-18.50**	**0.000**	**-14.87834**	**-12.02763**
fygpa	**-1.03486**	**.2600692**	**-3.98**	**0.000**	**-1.544586**	**-.5251334**
fygpa_hum	**1.002396**	**.2494722**	**4.02**	**0.000**	**.5134397**	**1.491353**
fygpahours	**.0367814**	**.084151**	**0.44**	**0.662**	**-.1281515**	**.2017143**
_cons	**-2.272171**	**1.039036**	**-2.19**	**0.029**	**-4.308643**	**-.2356984**

3						
rdr	**.108406**	**.3044922**	**0.36**	**0.722**	**−.4883878**	**.7051998**
1.finaid	**.4773771**	**.2793515**	**1.71**	**0.087**	**−.0701417**	**1.024896**
satv	**−.0050634**	**.0015396**	**−3.29**	**0.001**	**−.0080809**	**−.0020459**
satm	**.0079808**	**.0032067**	**2.49**	**0.013**	**.0016958**	**.0142658**
citz						
1	**.939466**	**.4034806**	**2.33**	**0.020**	**.1486586**	**1.730273**
2	**−11.08097**	**3.323522**	**−3.33**	**0.001**	**−17.59495**	**−4.566982**
ethnic2						
1	**1.187088**	**.3528274**	**3.36**	**0.001**	**.4955589**	**1.878617**
2	**−12.64581**	**.8996539**	**−14.06**	**0.000**	**−14.4091**	**−10.88252**
3	**.463143**	**4.855989**	**0.10**	**0.924**	**−9.05442**	**9.980706**
4	**−12.57338**	**.92808**	**−13.55**	**0.000**	**−14.39238**	**−10.75438**
5	**.8905892**	**.7610449**	**1.17**	**0.242**	**−.6010314**	**2.38221**
6	**−.5769037**	**3.131305**	**−0.18**	**0.854**	**−6.714148**	**5.560341**
1.gender2	**−.8444127**	**.3344959**	**−2.52**	**0.012**	**−1.500012**	**−.1888128**
year3						
5	**−10.98186**	**3.294688**	**−3.33**	**0.001**	**−17.43933**	**−4.52439**
6	**1.402763**	**7.697698**	**0.18**	**0.855**	**−13.68445**	**16.48997**
7	**.0002708**	**3.35184**	**0.00**	**1.000**	**−6.569215**	**6.569756**
8	**.0134005**	**.507705**	**0.03**	**0.979**	**−.981683**	**1.008484**
9	**.1879012**	**.4714607**	**0.40**	**0.690**	**−.7361448**	**1.111947**
10	**.2189141**	**.7096103**	**0.31**	**0.758**	**−1.171896**	**1.609725**
12	**−.4120585**	**.697191**	**−0.59**	**0.555**	**−1.778528**	**.9544108**
13	**−.0012284**	**.8363457**	**−0.00**	**0.999**	**−1.640436**	**1.637979**
14	**−.3872794**	**.6504553**	**−0.60**	**0.552**	**−1.662148**	**.8875896**
15	**.2171771**	**.5572389**	**0.39**	**0.697**	**−.8749911**	**1.309345**
16	**−.0299399**	**.5382624**	**−0.06**	**0.956**	**−1.084915**	**1.025035**
17	**.5966909**	**3.489801**	**0.17**	**0.864**	**−6.243193**	**7.436575**
18	**−12.96597**	**.6147128**	**−21.09**	**0.000**	**−14.17078**	**−11.76115**
19	**−13.24809**	**.9506125**	**−13.94**	**0.000**	**−15.11125**	**−11.38492**
fygpa	**−1.302152**	**.590952**	**−2.20**	**0.028**	**−2.460397**	**−.1439072**
fygpa_hum	**1.03606**	**.5284332**	**1.96**	**0.050**	**.0003502**	**2.07177**
fygpahours	**.0046081**	**.1162768**	**0.04**	**0.968**	**−.2232903**	**.2325065**
_cons	**−4.463083**	**2.481805**	**−1.80**	**0.072**	**−9.327331**	**.4011649**

Marginal effects at means for "Other" major

```
. margins, dydx(rdr finaid satv satm citz gender2 ethnic2 year3 fygpahours fygpa_hum fy
> gpa) predict(outcome(1)) atmeans

Conditional marginal effects                    Number of obs   =       2240
Model VCE    : Bootstrap
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.1029307	.0267336	3.85	0.000	.0505337	.1553276
1.finaid	-.0518086	.0185126	-2.80	0.005	-.0880926	-.0155245
satv	.001216	.0001362	8.93	0.000	.0009491	.001483
satm	-.0021101	.0001834	-11.51	0.000	-.0024696	-.0017507
citz						
1	-.0972313	.0384517	-2.53	0.011	-.1725952	-.0218674
2	.2978311	.0159556	18.67	0.000	.2665587	.3291035
ethnic2						
1	-.1853859	.0492195	-3.77	0.000	-.2818543	-.0889175
2	-.0980272	.1421702	-0.69	0.491	-.3766756	.1806212
3	-.0936303	.1290431	-0.73	0.468	-.3465501	.1592895
4	.0046113	.1233961	0.04	0.970	-.2372406	.2464632
5	-.057222	.1026271	-0.56	0.577	-.2583675	.1439234
6	.0462014	.0504006	0.92	0.359	-.052582	.1449848
1.gender2	.0840547	.0119711	7.02	0.000	.0605919	.1075175
year3						
5	.2872358	.0403416	7.12	0.000	.2081677	.3663039
6	-.2289059	.2656625	-0.86	0.389	-.7495947	.2917829
7	-.0019369	.0696918	-0.03	0.978	-.1385303	.1346564
8	-.0530857	.0636114	-0.83	0.404	-.1777617	.0715904
9	.031517	.050966	0.62	0.536	-.0683744	.1314084
10	-.0845017	.0640973	-1.32	0.187	-.2101301	.0411267
12	-.100291	.0487497	-2.06	0.040	-.1958386	-.0047434
13	-.021706	.0475798	-0.46	0.648	-.1149606	.0715487
14	.0025913	.0353259	0.07	0.942	-.0666461	.0718288
15	-.0209159	.0526525	-0.40	0.691	-.1241129	.0822811
16	.060108	.04592	1.31	0.191	-.0298937	.1501096
17	-.0398295	.0879889	-0.45	0.651	-.2122846	.1326256
18	.0777652	.6463433	0.12	0.904	-1.189044	1.344575
19	.2872427	.0403411	7.12	0.000	.2081757	.3663098
fygpa	.22144	.0536441	4.13	0.000	.1162995	.3265805
fygpa_hum	-.2117533	.050115	-4.23	0.000	-.3099768	-.1135298
fygpahours	-.0073635	.0166788	-0.44	0.659	-.0400534	.0253263

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

Where none of the coefficients were significant in the original model, *rdr, finaid, satv, satm, citz, Ethnicity 1, gender2, fygpa, fygpa_hum* are all significant at the means in this

model. All of these coefficients are basically the same as in the original model except that for fygpa, which is now .22144 where in the original model it is -0.0093445. The coefficient for *fygpa_hum* is of a similar magnitude but the opposite sign – its coefficient is -0.2117533. This tells us that as freshman year overall gpa increases by 1 unit, the probability that someone will become an "Other" major decreases by approximately 22%, but as their humanities grade increases by 1 unit, the probability that they will become an "Other" major decreases by approximately 21%. This is an intriguing finding, because freshman year humanities grade is a component of freshman year GPA, and so the natural expectation would be that a dependent variable would vary with both of them together. However, this also explains why when freshman year humanities grade is left out of the regression, freshman year GPA is not significant and has a much lower coefficient: it has two major components which offset each other. We will discuss this further in the conclusion.

Average marginal effects for "other" major

```
. margins, dydx(rdr finaid satv satm citz gender2 ethnic2 year3 fygpahours fygpa_hum fy
> gpa) predict(outcome(1))

Average marginal effects                        Number of obs   =       2240
Model VCE    : Bootstrap
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.0869528	.0236129	3.68	0.000	.0406724	.1332333
1.finaid	-.0469017	.0164775	-2.85	0.004	-.079197	-.0146064
satv	.0010614	.0001145	9.27	0.000	.000837	.0012859
satm	-.0018375	.0001406	-13.07	0.000	-.002113	-.001562
citz						
1	-.087076	.0341163	-2.55	0.011	-.1539428	-.0202093
2	.3367075	.0140787	23.92	0.000	.3091137	.3643012
ethnic2						
1	-.1595882	.0402305	-3.97	0.000	-.2384386	-.0807378
2	-.0813535	.1191086	-0.68	0.495	-.3148022	.1520951
3	-.0812989	.1207315	-0.67	0.501	-.3179283	.1553305
4	.0069882	.1094134	0.06	0.949	-.2074581	.2214346
5	-.0526215	.0878104	-0.60	0.549	-.2247267	.1194838
6	.0427127	.0499965	0.85	0.393	-.0552787	.1407041
1.gender2	.0770605	.0109948	7.01	0.000	.0555111	.0986098
year3						
5	.3251528	.0369715	8.79	0.000	.25269	.3976155
6	-.1946169	.2503909	-0.78	0.437	-.685374	.2961401
7	-.0016762	.0724032	-0.02	0.982	-.1435838	.1402315
8	-.0452138	.0551875	-0.82	0.413	-.1533792	.0629517
9	.0266814	.0453738	0.59	0.557	-.0622496	.1156124
10	-.0720882	.0544328	-1.32	0.185	-.1787744	.0345981
12	-.0832764	.0430738	-1.93	0.053	-.1676994	.0011466
13	-.01864	.0429769	-0.43	0.664	-.1028731	.0655932
14	.0036083	.0318244	0.11	0.910	-.0587664	.0659829
15	-.0189034	.0461777	-0.41	0.682	-.1094099	.0716031
16	.0534654	.0408797	1.31	0.191	-.0266572	.1335881
17	-.0369095	.0934746	-0.39	0.693	-.2201163	.1462973
18	.0751877	.6122582	0.12	0.902	-1.124816	1.275192
19	.3251658	.0369708	8.80	0.000	.2527043	.3976273
fygpa	.1953373	.045038	4.34	0.000	.1070644	.2836103
fygpa_hum	-.1856659	.0414575	-4.48	0.000	-.2669211	-.1044106
fygpahours	-.0062871	.0141441	-0.44	0.657	-.0340091	.0214348

The only change here from the original regression is that the coefficient for fygpa becomes significant and much larger; the coefficient for *fygpa_hum*, as with the regression at the means, is of a similar magnitude and the opposite sign, reinforcing the logic that while people who do well in the freshman humanities course have a higher

tendency to become “Other” majors, people who have higher GPAs on the whole have a correspondingly lower tendency to major in Math, Science, or Economics.

Marginal effects at means “Math and science” major

```
. margins, dydx(rdr finaid satv satm citz gender2 ethnic2 year3 fygpahours fygpa_hum fy
> gpa) predict(outcome(2)) atmeans

Conditional marginal effects                    Number of obs   =       2240
Model VCE    : Bootstrap
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	-.1073909	.0260497	-4.12	0.000	-.1584473	-.0563345
1.finaid	.0448858	.0181987	2.47	0.014	.009217	.0805546
satv	-.0011581	.0001279	-9.06	0.000	-.0014087	-.0009076
satm	.0020237	.0001694	11.95	0.000	.0016917	.0023557
citz						
1	.0771763	.0287721	2.68	0.007	.020784	.1335685
2	-.2811788	.0157105	-17.90	0.000	-.3119708	-.2503868
ethnic2						
1	.1562525	.0471676	3.31	0.001	.0638057	.2486993
2	.1185521	.141122	0.84	0.401	-.1580419	.3951462
3	.0858527	.08529	1.01	0.314	-.0813127	.253018
4	.0159136	.1224364	0.13	0.897	-.2240572	.2558845
5	.0317781	.1036421	0.31	0.759	-.1713566	.2349128
6	-.0379561	.0368953	-1.03	0.304	-.1102697	.0343574
1.gender2	-.0710904	.0166755	-4.26	0.000	-.1037738	-.038407
year3						
5	-.2673544	.0372592	-7.18	0.000	-.340381	-.1943278
6	.1939045	.3186056	0.61	0.543	-.430551	.8183601
7	.0019856	.0371188	0.05	0.957	-.0707659	.0747371
8	.0543182	.0619784	0.88	0.381	-.0671572	.1757936
9	-.0366877	.0502748	-0.73	0.466	-.1352245	.061849
10	.0825701	.065744	1.26	0.209	-.0462859	.2114261
12	.1088582	.0480699	2.26	0.024	.0146428	.2030735
13	.0223351	.0419231	0.53	0.594	-.0598326	.1045028
14	.0037436	.0324854	0.12	0.908	-.0599265	.0674138
15	.0168182	.0518658	0.32	0.746	-.0848369	.1184734
16	-.0611487	.0447302	-1.37	0.172	-.1488182	.0265208
17	.0256216	.0557622	0.46	0.646	-.0836702	.1349135
18	-.0578834	.6481153	-0.09	0.929	-1.328166	1.212399
19	-.2673609	.0372588	-7.18	0.000	-.3403867	-.1943351
fygpa	-.2042719	.0544486	-3.75	0.000	-.3109893	-.0975546
fygpa_hum	.1989816	.0514444	3.87	0.000	.0981524	.2998108
fygpahours	.0074671	.0172897	0.43	0.666	-.02642	.0413543

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

.
```

All of the coefficients that were significant for the marginal effects at the means in the "Other" category are again significant here; once again, the only major change in coefficient is in *fygpa*. Both *fygpa* and *fygpa_hum* are statistically significant, and they both have approximately the same magnitude but with opposite signs, as with the "Other" major category.

Average marginal effects "math and science" major

```
. margins, dydx(rdr finaid satv satm citz gender2 ethnic2 year3 fygpahours fygpa_hum fy
> gpa) predict(outcome(2))

Average marginal effects                        Number of obs   =       2240
Model VCE    : Bootstrap
```

	dy/dx	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	-.0960449	.0225236	-4.26	0.000	-.1401903	-.0518995
1.finaid	.0366763	.0159407	2.30	0.021	.0054332	.0679194
satv	-.0009905	.0001044	-9.49	0.000	-.0011951	-.000786
satm	.0017371	.0001325	13.11	0.000	.0014774	.0019967
citz						
1	.058908	.0218444	2.70	0.007	.0160938	.1017222
2	-.3100178	.0131664	-23.55	0.000	-.3358235	-.284212
ethnic2						
1	.1274441	.0386009	3.30	0.001	.0517877	.2031005
2	.1079188	.1186611	0.91	0.363	-.1246526	.3404903
3	.0729723	.0889459	0.82	0.412	-.1013584	.247303
4	.019577	.1092682	0.18	0.858	-.1945847	.2337387
5	.022288	.0923583	0.24	0.809	-.158731	.203307
6	-.0325915	.0364766	-0.89	0.372	-.1040843	.0389012
1.gender2	-.0587421	.0172708	-3.40	0.001	-.0925922	-.0248919
year3						
5	-.2954967	.0330372	-8.94	0.000	-.3602484	-.230745
6	.1530949	.3564867	0.43	0.668	-.5456062	.8517959
7	.0017863	.0429894	0.04	0.967	-.0824714	.086044
8	.0479278	.0539157	0.89	0.374	-.057745	.1536006
9	-.0350001	.0456256	-0.77	0.443	-.1244247	.0544245
10	.0708785	.0583416	1.21	0.224	-.0434691	.185226
12	.0968562	.042149	2.30	0.022	.0142456	.1794667
13	.0199675	.0365117	0.55	0.584	-.0515942	.0915291
14	.0056334	.0286401	0.20	0.844	-.0505002	.061767
15	.0134634	.0463453	0.29	0.771	-.0773717	.1042986
16	-.056448	.0407042	-1.39	0.166	-.1362267	.0233308
17	.0178154	.0780046	0.23	0.819	-.1350708	.1707015
18	-.0455304	.6152832	-0.07	0.941	-1.251463	1.160403
19	-.2955086	.0330359	-8.95	0.000	-.3602577	-.2307595
fygpa	-.1717321	.0469031	-3.66	0.000	-.2636605	-.0798038
fygpa_hum	.1689727	.0445082	3.80	0.000	.0817383	.2562072
fygpahours	.00659	.0154863	0.43	0.670	-.0237626	.0369425

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

Citizenship becomes significant in this model, where it was not significant in the original model, but the magnitude of the coefficient is approximately the same. As with the "Other" major category, *fygpa* becomes significant in this model where it was not in the original model, and *fygpa_hum* is also significant, with a coefficient of approximately the same magnitude and the opposite sign.

Marginal effects at means for "Econ" major

```
. margins, dydx(rdr finaid satv satm citz gender2 ethnic2 year3 fygpahours fygpa_hum fy
> gpa) predict(outcome(3)) atmeans

Conditional marginal effects                    Number of obs   =       2240
Model VCE    : Bootstrap
```

	Delta-method					
	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.00446	.0053865	0.83	0.408	-.0060974	.0150175
1.finaid	.0069227	.0047917	1.44	0.149	-.0024687	.0163142
satv	-.0000579	.0000351	-1.65	0.099	-.0001267	.000011
satm	.0000864	.0000537	1.61	0.108	-.0000188	.0001916
citz						
1	.0200551	.0149808	1.34	0.181	-.0093068	.0494169
2	-.0166523	.0066072	-2.52	0.012	-.0296022	-.0037025
ethnic2						
1	.0291334	.0133512	2.18	0.029	.0029655	.0553012
2	-.0205249	.0063446	-3.24	0.001	-.0329601	-.0080897
3	.0077776	.1327923	0.06	0.953	-.2524905	.2680457
4	-.0205249	.0063446	-3.24	0.001	-.0329601	-.0080897
5	.0254439	.0314404	0.81	0.418	-.0361782	.0870661
6	-.0082453	.0380581	-0.22	0.828	-.0828378	.0663472
1.gender2	-.0129643	.0091846	-1.41	0.158	-.0309659	.0050373
year3						
5	-.0198814	.0079375	-2.50	0.012	-.0354387	-.0043241
6	.0350014	.4037692	0.09	0.931	-.7563718	.8263745
7	-.0000487	.064814	-0.00	0.999	-.1270818	.1269845
8	-.0012325	.0091	-0.14	0.892	-.0190683	.0166032
9	.0051707	.0105699	0.49	0.625	-.015546	.0258875
10	.0019316	.0150871	0.13	0.898	-.0276385	.0315018
12	-.0085672	.0101538	-0.84	0.399	-.0284683	.0113339
13	-.0006291	.0155173	-0.04	0.968	-.0310424	.0297842
14	-.006335	.0100924	-0.63	0.530	-.0261157	.0134458
15	.0040977	.0121157	0.34	0.735	-.0196487	.027844
16	.0010408	.0106224	0.10	0.922	-.0197787	.0218602
17	.0142079	.1143888	0.12	0.901	-.2099901	.2384059
18	-.0198818	.0079368	-2.51	0.012	-.0354376	-.0043261
19	-.0198818	.0079367	-2.51	0.012	-.0354375	-.0043261
fygpa	-.0171653	.0100502	-1.71	0.088	-.0368634	.0025328
fygpa_hum	.0127694	.0091922	1.39	0.165	-.0052469	.0307857
fygpahours	-.0001036	.0020804	-0.05	0.960	-.0041812	.003974

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

For Economics majors, at the means, Ethnicity 1 (Asian) becomes significant where it was not in the original regression, but the coefficient remains approximately the same. Both *satv* and *fygpa* become significant at the 10% level, but only fygpa has a substantial change in its coefficient, from -0.003505 to -0.0171653, telling us that as *fygpa* increases by one unit, the probability that the mean student will become an Economics major decreases by 1.7% - an unflattering but not devastating statistic for the Economics department.

Average marginal effects for "Econ" major

```
. margins, dydx(rdr finaid satv satm citz gender2 ethnic2 year3 fygpahours fygpa_hum fy
> gpa) predict(outcome(3))

Average marginal effects                        Number of obs   =       2240
Model VCE    : Bootstrap
```

	Delta-method dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rdr	.009092	.0084609	1.07	0.283	-.0074911	.0256752
1.finaid	.0102254	.0072232	1.42	0.157	-.0039317	.0243825
satv	-.0000709	.0000483	-1.47	0.142	-.0001656	.0000237
satm	.0001005	.0000844	1.19	0.234	-.000065	.0002659
citz						
1	.028168	.0201817	1.40	0.163	-.0113874	.0677235
2	-.0266897	.0094931	-2.81	0.005	-.0452959	-.0080835
ethnic2						
1	.0321441	.0145015	2.22	0.027	.0037217	.0605665
2	-.0265653	.0084623	-3.14	0.002	-.043151	-.0099796
3	.0083266	.1589547	0.05	0.958	-.3032188	.3198721
4	-.0265652	.0084622	-3.14	0.002	-.0431509	-.0099796
5	.0303335	.0380322	0.80	0.425	-.0442082	.1048751
6	-.0101212	.049706	-0.20	0.839	-.1075431	.0873008
1.gender2	-.0183184	.0126965	-1.44	0.149	-.0432031	.0065663
year3						
5	-.0296561	.0099565	-2.98	0.003	-.0491705	-.0101417
6	.0415221	.4959992	0.08	0.933	-.9306185	1.013663
7	-.0001101	.0928831	-0.00	0.999	-.1821577	.1819375
8	-.002714	.0126599	-0.21	0.830	-.027527	.022099
9	.0083188	.0154166	0.54	0.589	-.0218972	.0385348
10	.0012097	.0210795	0.06	0.954	-.0401054	.0425248
12	-.0135797	.014038	-0.97	0.333	-.0410937	.0139342
13	-.0013275	.0219622	-0.06	0.952	-.0443725	.0417176
14	-.0092416	.0143486	-0.64	0.520	-.0373644	.0188812
15	.00544	.0169096	0.32	0.748	-.0277022	.0385821
16	.0029825	.0156801	0.19	0.849	-.0277499	.0337149
17	.0190941	.1549818	0.12	0.902	-.2846647	.3228529
18	-.0296572	.0099558	-2.98	0.003	-.0491702	-.0101442
19	-.0296572	.0099557	-2.98	0.003	-.04917	-.0101444
fygpa	-.0236052	.0153985	-1.53	0.125	-.0537856	.0065753
fygpa_hum	.0166931	.0142799	1.17	0.242	-.011295	.0446813
fygpahours	-.0003029	.0034452	-0.09	0.930	-.0070554	.0064497

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

Ethnicity 1 becomes statistically significant in this regression, where it was not in the original regression, but the coefficient does not change substantially. Any other changes in significance are in variables that have negligible observations and are therefore not good indicators of general trends.

Conclusion

What most strikes us about our multiple models is their fundamental similarities. Somewhat reassuringly, no one of the variables that we removed or changed out for a different variable overthrew our whole regression; rather, the most that we would see would be a slight change in another coefficient or an increase or decrease in the significance levels of other coefficients. The most major change was in Model 4, when we included both freshman year GPA and freshman year humanities grade, and the coefficients for freshman year GPA both increased greatly in magnitude and became significant, as did the coefficients for freshman year humanities grade. This relative constancy tells us that our model is somewhat reliable as an estimator for the general patterns in the Reed student population's selection of majors. Our initial assumptions that being male, being of Asian descent, being on financial aid, being an international student, and having a better reader rating would all increase the probability of becoming a Mathematics, Science, or Economics major, were all verified: on the whole, the probability of becoming a non-Math, non-Science, non-Economics major increased by approximately 9% with an increase in reader rating by 1 point, was approximately 5% lower in students on financial aid, was approximately 9% lower in international students, was approximately 8% higher in women, and approximately 16% lower in students of Asian descent.

As we expected, the Economics major category seems to share many of the characteristics of the Math and Science major category, but due to the small sample size, the coefficients were generally less statistically significant. As with Math and Sciences, international students, students of Asian descent, men, students on financial aid, and students with higher SAT math scores (and lower SAT verbal scores) tend to become Economics majors. However, interestingly, the deviation from this pattern of similarity between Economics and Math and Science majors is illuminated in Model 4; Economics follows the pattern of the "Other" major category in that students with higher freshman year GPAs are less likely to become Economics majors, and students with higher humanities grades are more likely to become Economics majors. It would be interesting

to see whether these patterns stayed with a larger sample size, and if so, to examine what this tells us about the ways in which Economics – and the students that it attracts – are similar to Math and Science majors, and the ways in which they are more similar to "Other" majors.

Despite the highly comparable nature of the models that we are examining, they are not fully comparable; due to limitations of the dataset, in which we had missing values in different variables for different cases, there are observations which are included in some regressions but not in others. Therefore it is slightly problematic to assume that all of these models are completely comparable. Another consequence of limited data is that there are some coefficients that are rendered utterly meaningless in the regression. For example, the small sample sizes of students of certain ethnicities, specifically Black and Native American students, rendered the statistically significant coefficients for these groups in certain regressions meaningless. Furthermore, our use of many indicator variables with this data means that we are comparing groups with very incomparable numbers – using ethnicity as an example again, the base case (Caucasian) has multiple times the observations that any other group has.

After analysis of each of our permutations of the original model, we settled upon Alternative Model 4, the one in which we include both *fygpa* and *fygpa_hum* as regressors as our favored model. Inclusion of both these variables illuminates the divergence between them despite the fact that *fygpa_hum* is a component of *fygpa*, eliminating – or at least reducing – the problem of one cancelling out the other's effects when only *fygpa* is included. It makes intuitive sense that students with superior verbal skills would do better in humanities and be more inclined toward non-quantitative majors, while those whose strengths lie in more quantitative areas would be less likely to do well in humanities but more likely to do well in other subjects, such as introductory science courses, which most freshmen take. Therefore, intuitively, we would expect a general trend for people with higher GPAs to be Math and Science majors, and for people with higher Humanities grades to be "Other" majors, as is reflected in this model.

Based on our findings, it could be interesting to investigate how the proportions of Math, Science, and Economics majors at Reed might change due to increases in students coming from low-income backgrounds. Another question in this vein is how these proportions might shift if more foreigners enrolled at the college, or if the school recruited more Asian students. It could also be interesting to re-run these regressions after splitting up the "Other" major category (in this case we would have more options for our dependent variable. For example, we could have categories for social sciences, art, languages, etc.). Obviously any further work on these questions would be relevant specifically to Reed, and could not be generalized to all types of post-secondary education.

On the whole, we are relatively comfortable concluding that our initial assumptions were generally supported by the data, despite the minor limitations of the dataset.