Project Description

The variables which are essential for predicting credit rating are as follows -

Predictor	Effect	Rationale
Income	+	Income is a major factor for deciding credit limit and credit score accordingly as high-income consumers have more ability to pay credit bill on time.
Limit	+	High credit limit indicates that banks trust more on these consumers because of their previous payment record as well as their earning ability.
Age	+	Generally, consumers with higher age earn more and have more ability to pay credit card bills which helps to improve their credit score.
Education	+	Consumers with more number of education years tend to earn more and pay their credit card bills on time
Student	-	Generally, students earn less so there is a good possibility that they will not pay their credit card bills on time which affects negatively on the credit score.
Married	+	Married people generally have more liabilities which keep them alert to pay bills on time in order to maintain good credit score to have ability to lend more loans in future if required.
Balance	+	Consumers with high balance generally have ability to pay bills which impacts their credit score positively.
Cards	+/-	Generally, consumers with more number of cards tent to have more credit rating as more banks rely on them but if they are not paying bills on time then it might be affecting their credit score negatively.

Variables which are not considered for prediction are as follows –

Predictor	**Effect**	**Rationale**
ID	0	Not Required.
Gender	0	Gender should not be a factor for deciding credit rating.
Ethnicity	0	Ethnicity should not be a factor for deciding the credit rating.

	Dependent variable:		
	rating		
	(1)	(2)	(3)
income	0.120** (0.047)	0.121** (0.047)	0.123*** (0.047)
limit	0.063*** (0.001)	0.063*** (0.001)	0.063*** (0.001)
cards	4.597*** (0.391)	4.597*** (0.391)	4.596*** (0.391)
age	0.015 (0.030)	0.015 (0.030)	0.013 (0.030)
education	-0.240 (0.164)	-0.240 (0.164)	-0.235 (0.164)
studentYes	-1.965 (2.792)	-2.003 (2.804)	-1.960 (2.793)
marriedYes	2.222** (1.050)	2.219** (1.052)	2.386** (1.057)
balance	0.012** (0.005)	0.012** (0.005)	0.012** (0.005)
genderMale		-0.180 (1.020)	
ethnicityCaucasian			-0.308 (1.254)
ethnicityHispanic			-1.998 (1.447)
Constant	31.271*** (3.967)	31.380*** (4.021)	32.091*** (4.113)
Observations	400	400	400
R2	0.996	0.996	0.996
Adjusted R2	0.996	0.996	0.996
Residual Std. Error	10.140 (df = 391)	10.152 (df = 390)	10.134 (df = 389)
F Statistic	11,564.650*** (df = 8; 391)	10,254.220*** (df = 9; 390)	9,261.224*** (df = 10; 389)

Note: *p<0.1; **p<0.05; ***p<0.01

Rationale: I have added three models here

1. 1st model is a basic model excluding gender and ethnicity
2. Gender variable is added in 2nd model for studying the effect of gender difference.

3. Ethnicity variable is added in 3rd model for studying the effect of ethnicity difference.

Interpretations are as follows –

1. Variables which predict credit score, and their impacts are as follows –

Variable	Impact
Income	Addition of $1000 in income increases credit rating by 0.120
Limit	Addition of $1000 in limit increases credit rating by 0.063
Cards	Addition of card increases credit rating by 4.5
Age	Credit rating increases by 0.015 by each year
Student	Credit rating decreases by 1.965 if consumer is a student
Married	Credit rating increases 2.22 for married consumers
Balance	Addition of $1000 in balance increases credit rating by 0.012

*Increase in education is decreasing the credit rating which is indicating some discrepancy in data. Also, we don't fail to prove that education is a significant factor.

2. Is there a racial or gender bias on credit score? If so, by how much?

- There is no major racial bias observed. But one thing to note that comparatively African Americans are having higher credit rating than Caucasians (lower by 0.308 than African Americans) and Hispanics (lower by 1.998 308 than African Americans).
- There is no major gender bias observed. (Females have credit scores higher by 0.180 than males)