8.6

(a)

12.024^2 = 144.5766

97161.9174 / 573 = 169.5670

F = 169.5670 / 144.5766 = 1.1729

F\_0.025(573, 419) = 1.19, F\_0.975(573, 419) = 0.84

Since 0.84 < 1.1729 < 1.19, we fail to reject the null hypothesis. Thus, the error variances for males and females are not significantly different.

我們進行F檢定比較男女樣本的誤差變異數。結果顯示F值落在臨界值之間，因此無法拒絕虛無假設，說明男女的誤差變異數沒有顯著差異。

(b)

56231.0382 / 395 = 142.3571

100703.0471 / 595 = 169.2488

F = 169.2488 / 142.3571 = 1.19

Since F = 1.19 > F\_0.05(595, 395) = 1.16, we reject the null hypothesis. Therefore, error variances differ between married and unmarried individuals.

這裡比較已婚與未婚者的誤差變異數。F值大於臨界值，顯示誤差變異數在婚姻狀態間有顯著差異，因此拒絕虛無假設。

(c)

χ²₀.₀₅,₄ = 9.488

Since 59.03 > 9.488, we reject the null hypothesis. There is significant heterogeneity in error variances between married and unmarried groups.

使用卡方檢定來判斷誤差變異是否相等，實際統計值遠大於臨界值，因此我們拒絕虛無假設，代表婚姻狀態間存在明顯的誤差變異差異。

(d)

Degrees of freedom = 5

5% critical value = 11.07

Since 78.82 > 11.07, we reject the null hypothesis. There is significant evidence of different error variation across marital status.

本題同樣是針對婚姻狀態進行變異性檢定，統計值 78.82 遠超臨界值 11.07，因此拒絕誤差變異相等的假設。

(e)

Narrower robust standard errors: EXPER, METRO, FEMALE

Wider robust standard errors: EDUC

No. If the error term is highly correlated with the variable, the robust standard error tends to increase.

使用robust標準誤後，不同變數的估計不確定性改變，有些變窄（代表估計更穩定），有些變寬。若誤差項與某變數高度相關，robust標準誤可能會變大。

(f)

No. A change in error variance does not imply a change in the estimated effect on the mean. These are conceptually distinct.

誤差變異的改變不代表變數對平均數的影響也會改變。變異性和平均效果是兩個不同的概念。