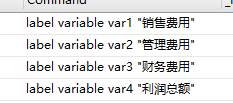
实验6

蔡梦璋 2014211436



对数据进行标准化处理：

. egen x1=std(var2)

.

. egen x2=std(var3)

.

. egen x3=std(var4)

回归

. reg x3 x1 x2

Source | SS df MS Number of obs = 39

-------------+------------------------------ F( 2, 36) = 12.56

Model | 15.6170213 2 7.80851067 Prob > F = 0.0001

Residual | 22.3829807 36 .621749463 R-squared = 0.4110

-------------+------------------------------ Adj R-squared = 0.3783

Total | 38.000002 38 1.00000005 Root MSE = .78851

------------------------------------------------------------------------------

x3 | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

x1 | -.0136254 .1769725 -0.08 0.939 -.3725422 .3452915

x2 | .6504132 .1769725 3.68 0.001 .2914964 1.00933

\_cons | 2.13e-09 .1262628 0.00 1.000 -.2560728 .2560728

------------------------------------------------------------------------------

Prob > F = 0.0001

F检验为0.001 模型较好。

判断共线性：

. estat vif

Variable | VIF 1/VIF

-------------+----------------------

x1 | 1.91 0.522421

x2 | 1.91 0.522421

-------------+----------------------

Mean VIF | 1.91

由VIF值可得该模型有严重的多重共线性

有共线性时：

α1= -0.0136254

α2= 0.6504132

表明管理费用每增加1，利润总额减少0.0136254，财务费用每增加1，利润总额增加.6504132

使用**逐步回归法**消除共线性：

. stepwise x1 x2

Source | SS df MS Number of obs = 39

-------------+------------------------------ F( 1, 37) = 33.82

Model | 18.1480141 1 18.1480141 Prob > F = 0.0000

Residual | 19.8519843 37 .536540116 R-squared = 0.4776

-------------+------------------------------ Adj R-squared = 0.4635

Total | 37.9999984 38 .999999959 Root MSE = .73249

------------------------------------------------------------------------------

x1 | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

x2 | .6910711 .1188254 5.82 0.000 .450308 .9318343

\_cons | -6.74e-09 .1172921 -0.00 1.000 -.2376564 .2376564

estat vif

Variable | VIF 1/VIF

-------------+----------------------

x2 | 1.00 1.000000

-------------+----------------------

Mean VIF | 1.00

此时的VIF值为1，消除了多重共线性

没有共线性时：

α1= .6910711

消除共线性后，α的值降低，财务费用每增加1，利润总额增加.6910711

使用**主**成分分析法消除共线性：

. pca x1 x2

Principal components/correlation Number of obs = 39

Number of comp. = 2

Trace = 2

Rotation: (unrotated = principal) Rho = 1.0000

--------------------------------------------------------------------------

Component | Eigenvalue Difference Proportion Cumulative

-------------+------------------------------------------------------------

Comp1 | 1.69107 1.38214 0.8455 0.8455

Comp2 | .308929 . 0.1545 1.0000

--------------------------------------------------------------------------

Principal components (eigenvectors)

------------------------------------------------

Variable | Comp1 Comp2 | Unexplained

-------------+--------------------+-------------

x1 | 0.7071 0.7071 | 0

x2 | 0.7071 -0.7071 | 0

第一个特征值的累积贡献率已达84.55%，说明第一个主成分基本包含了全部指标具有的信息，我们取第一个特征值

. predict f, score

(1 components skipped)

Scoring coefficients

sum of squares(column-loading) = 1

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Variable | Comp1 Comp2

-------------+--------------------

x1 | 0.7071

x2 | 0.7071 -0.7071

----------------------------------

. reg x3 f

Source | SS df MS Number of obs = 39

-------------+------------------------------ F( 1, 37) = 19.30

Model | 13.0288161 1 13.0288161 Prob > F = 0.0001

Residual | 24.9711859 37 .674896917 R-squared = 0.3429

-------------+------------------------------ Adj R-squared = 0.3251

Total | 38.000002 38 1.00000005 Root MSE = .82152

------------------------------------------------------------------------------

x3 | Coef. Std. Err. t P>|t| [95% Conf. Interval]

-------------+----------------------------------------------------------------

f | .450277 .1024816 4.39 0.000 .2426295 .6579244

\_cons | 2.74e-11 .1315487 0.00 1.000 -.2665429 .2665429

F检验的P值为0.0001，模型总体是显著的，模型较好

. estat vif

Variable | VIF 1/VIF

-------------+----------------------

f | 1.00 1.000000

-------------+----------------------

Mean VIF | 1.00

没有共线性时：

α1= .450277

消除共线性后，α的值降低，主成分每增加1，利润总额增加.450277