EXAMEN FINAL DE ECONOMETRÍA I (GRUPO 2)

1. **Considere la base de datos que se le proporcionó.**
2. **Estime una ecuación de regresión considerando solo X1 y X2 como variables explicativas. Interprete sus resultados.**

Hacemos la regresión y tenemos la siguiente ecuación:

LOG(Y) = 3.33380427873 + 0.0125564453455\*X1 - 0.000378564798534\*X2

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| --- | --- | --- | --- | --- |
| Dependent Variable: Y | | |  |  |
| Method: Least Squares | | |  |  |
| Date: 11/23/20 Time: 07:04 | | | |  |
| Sample: 1 30 | |  |  |  |
| Included observations: 30 | | |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 15.32762 | 7.160234 | 2.140659 | 0.0415 |
| X1 | 0.780343 | 0.119388 | 6.536217 | 0.0000 |
| X2 | -0.050160 | 0.129919 | -0.386085 | 0.7025 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.683064 | Mean dependent var | | 64.63333 |
| Adjusted R-squared | 0.659587 | S.D. dependent var | | 12.17256 |
| S.E. of regression | 7.102070 | Akaike info criterion | | 6.853289 |
| Sum squared resid | 1361.864 | Schwarz criterion | | 6.993409 |
| Log likelihood | -99.79934 | Hannan-Quinn criter. | | 6.898115 |
| F-statistic | 29.09534 | Durbin-Watson stat | | 2.209781 |
| Prob(F-statistic) | 0.000000 |  |  |  |
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|  |  |  |  |  |

X1 y Y tienen una relación directa, mientras X2 y Y tiene una relación inversa, el modelo no tiene autocorrelación ya que su Durbin Watson es cercano a 2, además X1 es significativa mientas la variable X2 no es significativa.

1. **Estime una ecuación de regresión considerando solo X1 y X3 como variables explicativas. Interprete sus resultados.**

Tenemos la siguiente ecuación:

LOG(Y) = 3.26230007674 + 0.010776156156\*X1 + 0.00301520495067\*X3

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| --- | --- | --- | --- | --- |
| Dependent Variable: Y | | |  |  |
| Method: Least Squares | | |  |  |
| Date: 11/23/20 Time: 07:05 | | | |  |
| Sample: 1 30 | |  |  |  |
| Included observations: 30 | | |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
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|  |  |  |  |  |
| C | 9.870880 | 7.061224 | 1.397899 | 0.1735 |
| X1 | 0.643518 | 0.118477 | 5.431563 | 0.0000 |
| X3 | 0.211192 | 0.134404 | 1.571324 | 0.1278 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.708015 | Mean dependent var | | 64.63333 |
| Adjusted R-squared | 0.686387 | S.D. dependent var | | 12.17256 |
| S.E. of regression | 6.816779 | Akaike info criterion | | 6.771291 |
| Sum squared resid | 1254.649 | Schwarz criterion | | 6.911411 |
| Log likelihood | -98.56936 | Hannan-Quinn criter. | | 6.816116 |
| F-statistic | 32.73528 | Durbin-Watson stat | | 1.958181 |
| Prob(F-statistic) | 0.000000 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Las variables X1 y X3 tienen relación directa con la variable Y, sin embargo la variable X3 no es significativa.

1. **Especifique cuál de los modelos se puede considerar como el más óptimo. Sustente por qué.**

El modelo más optimo es el segundo modelo donde la variable Y es explicada por X1 y X3, además su R2 es mejor que del primer modelo.

1. **Si determina algún problema en la estimación de a. y b. explíquelo y plantee una forma de solucionar dicho problema.**

En el segundo modelo tenemos el problema de heterocedasticidad

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Heteroskedasticity Test: White | | | |  |
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|  |  |  |  |  |
| F-statistic | 3.178438 | Prob. F(5,24) | | 0.0243 |
| Obs\*R-squared | 11.95136 | Prob. Chi-Square(5) | | 0.0355 |
| Scaled explained SS | 3.633775 | Prob. Chi-Square(5) | | 0.6032 |
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|  |  |  |  |  |
| Test Equation: | | |  |  |
| Dependent Variable: RESID^2 | | | |  |
| Method: Least Squares | | |  |  |
| Date: 11/23/20 Time: 07:21 | | | |  |
| Sample: 1 30 | |  |  |  |
| Included observations: 30 | | |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 149.9251 | 166.6264 | 0.899768 | 0.3772 |
| X1^2 | -0.027102 | 0.032940 | -0.822764 | 0.4187 |
| X1\*X3 | 0.044936 | 0.057328 | 0.783845 | 0.4408 |
| X1 | 0.764823 | 4.056672 | 0.188535 | 0.8520 |
| X3^2 | -0.018411 | 0.059910 | -0.307304 | 0.7613 |
| X3 | -2.589842 | 5.360651 | -0.483121 | 0.6334 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.398379 | Mean dependent var | | 41.82163 |
| Adjusted R-squared | 0.273041 | S.D. dependent var | | 36.85577 |
| S.E. of regression | 31.42393 | Akaike info criterion | | 9.909873 |
| Sum squared resid | 23699.13 | Schwarz criterion | | 10.19011 |
| Log likelihood | -142.6481 | Hannan-Quinn criter. | | 9.999524 |
| F-statistic | 3.178438 | Durbin-Watson stat | | 1.703672 |
| Prob(F-statistic) | 0.024260 |  |  |  |
|  |  |  |  |  |
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De acuerdo con el test de White el modelo presenta Heterocedasticidad, ya forma de solucionar el problema es transformando las variables.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Dependent Variable: LOG(Y) | | |  |  |
| Method: Least Squares | | |  |  |
| Date: 11/23/20 Time: 07:32 | | | |  |
| Sample: 1 30 | |  |  |  |
| Included observations: 30 | | |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 0.931013 | 0.466400 | 1.996169 | 0.0561 |
| LOG(X1) | 0.767905 | 0.128656 | 5.968656 | 0.0000 |
| LOG(X2) | 0.002762 | 0.118362 | 0.023333 | 0.9816 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.665461 | Mean dependent var | | 4.149949 |
| Adjusted R-squared | 0.640681 | S.D. dependent var | | 0.202163 |
| S.E. of regression | 0.121183 | Akaike info criterion | | -1.288387 |
| Sum squared resid | 0.396505 | Schwarz criterion | | -1.148268 |
| Log likelihood | 22.32581 | Hannan-Quinn criter. | | -1.243562 |
| F-statistic | 26.85409 | Durbin-Watson stat | | 2.134749 |
| Prob(F-statistic) | 0.000000 |  |  |  |
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1. **Con la misma base de datos:**
2. **Estime el modelo completo con las 6 variables explicativas.**

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| --- | --- | --- | --- | --- |
| Dependent Variable: Y | | |  |  |
| Method: Least Squares | | |  |  |
| Date: 11/23/20 Time: 07:04 | | | |  |
| Sample: 1 30 | |  |  |  |
| Included observations: 30 | | |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 10.78708 | 11.58926 | 0.930782 | 0.3616 |
| X1 | 0.613188 | 0.160983 | 3.809018 | 0.0009 |
| X2 | -0.073050 | 0.135725 | -0.538223 | 0.5956 |
| X3 | 0.320332 | 0.168520 | 1.900852 | 0.0699 |
| X4 | 0.081732 | 0.221478 | 0.369031 | 0.7155 |
| X5 | 0.038381 | 0.146995 | 0.261106 | 0.7963 |
| X6 | -0.217057 | 0.178209 | -1.217986 | 0.2356 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.732602 | Mean dependent var | | 64.63333 |
| Adjusted R-squared | 0.662846 | S.D. dependent var | | 12.17256 |
| S.E. of regression | 7.067994 | Akaike info criterion | | 6.949994 |
| Sum squared resid | 1149.000 | Schwarz criterion | | 7.276940 |
| Log likelihood | -97.24991 | Hannan-Quinn criter. | | 7.054587 |
| F-statistic | 10.50235 | Durbin-Watson stat | | 1.795318 |
| Prob(F-statistic) | 0.000012 |  |  |  |
|  |  |  |  |  |
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1. **Estime la ecuación en 1b de la pregunta 1 y compárelo con el modelo con las seis variables explicativas. Evalué la Hipótesis H0: β2= β4= β5= β6=0. Considere un F de la tabla 2.8. Interprete su conclusión.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Dependent Variable: Y | | |  |  |
| Method: Least Squares | | |  |  |
| Date: 11/23/20 Time: 07:05 | | | |  |
| Sample: 1 30 | |  |  |  |
| Included observations: 30 | | |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 9.870880 | 7.061224 | 1.397899 | 0.1735 |
| X1 | 0.643518 | 0.118477 | 5.431563 | 0.0000 |
| X3 | 0.211192 | 0.134404 | 1.571324 | 0.1278 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.708015 | Mean dependent var | | 64.63333 |
| Adjusted R-squared | 0.686387 | S.D. dependent var | | 12.17256 |
| S.E. of regression | 6.816779 | Akaike info criterion | | 6.771291 |
| Sum squared resid | 1254.649 | Schwarz criterion | | 6.911411 |
| Log likelihood | -98.56936 | Hannan-Quinn criter. | | 6.816116 |
| F-statistic | 32.73528 | Durbin-Watson stat | | 1.958181 |
| Prob(F-statistic) | 0.000000 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

En el primer modelo las variables explicativas no son estadísticamente significativas, a excepción de la variable explicativa X1 con un Nivel de Significancia de 0.05. En cambio, en estimación b1 la variable X3 no es estadísticamente significativa.

La R2 explica que el 73 % de las fluctuaciones de Y en promedio están siendo explicados por las variables X1 X2 X3 X4 X5 X6.

PRUEBA DE HIPOTESIS

H0: b2=b4=b5=b6=0

H1: b2=b4=b5=b60

Con un F de tabla 2.8.

Con un α=0.05, F tabla: 19.371

F calculado = 10.714

Por lo tanto, F calculado cae en la región de aceptación. Tenemos lo criterios suficientes para aceptar H0

1. **Utilizando la misma base de datos, especifique un modelo óptimo. Compare ambos modelos y evalué el modelo elegido.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | A | B | C | D | E | F |
| CONSTANTE | |  | | --- | | 14.37632 | | |  | | --- | | 42.10866 | | |  | | --- | | 28.17412 | | |  | | --- | | 19.97779 | | |  | | --- | | 50.24456 | | |  | | --- | | 56.75582 | |
| X1 | |  |  |  | | --- | --- | --- | | |  |  | | --- | --- | | |  | | --- | | 0.0000 | | | |  |  |  |  |  |
| X2 |  | |  | | --- | | 0.0189 | |  |  |  |  |
| X3 |  |  | |  |  | | --- | --- | | |  | | --- | | 0.0002 | | |  |  |  |
| X4 |  |  |  | |  |  | | --- | --- | | |  | | --- | | 0.0006 | | |  |  |
| X5 |  |  |  |  | |  |  | | --- | --- | | |  | | --- | | 0.4091 | | |  |
| X6 |  |  |  |  |  | |  |  | | --- | --- | | |  | | --- | | 0.4132 | | |
| R2 | |  | | --- | | 0.681314 | | |  | | --- | | 0.181576 | | |  | | --- | | 0.388974 | | |  | | --- | | 0.348264 | | |  | | --- | | 0.024473 | | |  | | --- | | 0.024052 | |

El mejor modelo es el siguiente: Y=X1+X2+X3+X6

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Dependent Variable: Y | | |  |  |
| Method: Least Squares | | |  |  |
| Date: 11/23/20 Time: 07:55 | | | |  |
| Sample: 1 30 | |  |  |  |
| Included observations: 30 | | |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 14.30347 | 7.739565 | 1.848097 | 0.0765 |
| X1 | 0.653378 | 0.130511 | 5.006290 | 0.0000 |
| X2 | -0.076817 | 0.130588 | -0.588244 | 0.5616 |
| X3 | 0.323950 | 0.157408 | 2.058019 | 0.0502 |
| X6 | -0.171510 | 0.149040 | -1.150761 | 0.2607 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.729341 | Mean dependent var | | 64.63333 |
| Adjusted R-squared | 0.686036 | S.D. dependent var | | 12.17256 |
| S.E. of regression | 6.820591 | Akaike info criterion | | 6.828781 |
| Sum squared resid | 1163.012 | Schwarz criterion | | 7.062314 |
| Log likelihood | -97.43172 | Hannan-Quinn criter. | | 6.903490 |
| F-statistic | 16.84181 | Durbin-Watson stat | | 1.820195 |
| Prob(F-statistic) | 0.000001 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Tenemos un modelo con coeficientes significativos con R2 mejor que el modelo de las 6 variables.

1. **En el modelo elegido, evalúe los siguientes supuestos de MRLC**
2. **Multicolinealidad: Calcule el factor de inflación (VIF)**
3. **Heteroscedasticidad: Prueba de White**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Heteroskedasticity Test: White | | | |  |
|  |  |  |  |  |
|  |  |  |  |  |
| F-statistic | 0.989073 | Prob. F(14,15) | | 0.5058 |
| Obs\*R-squared | 14.40047 | Prob. Chi-Square(14) | | 0.4203 |
| Scaled explained SS | 4.983139 | Prob. Chi-Square(14) | | 0.9860 |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Test Equation: | | |  |  |
| Dependent Variable: RESID^2 | | | |  |
| Method: Least Squares | | |  |  |
| Date: 11/23/20 Time: 07:56 | | | |  |
| Sample: 1 30 | |  |  |  |
| Included observations: 30 | | |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|  |  |  |  |  |
|  |  |  |  |  |
| C | 147.8717 | 301.7593 | 0.490032 | 0.6312 |
| X1^2 | 0.044555 | 0.088336 | 0.504373 | 0.6213 |
| X1\*X2 | 0.002652 | 0.123918 | 0.021403 | 0.9832 |
| X1\*X3 | -0.065462 | 0.192298 | -0.340420 | 0.7383 |
| X1\*X6 | -0.020248 | 0.156730 | -0.129187 | 0.8989 |
| X1 | -0.758228 | 7.064284 | -0.107333 | 0.9159 |
| X2^2 | -0.127245 | 0.084193 | -1.511343 | 0.1515 |
| X2\*X3 | 0.091926 | 0.121574 | 0.756135 | 0.4613 |
| X2\*X6 | 0.051308 | 0.158181 | 0.324364 | 0.7501 |
| X2 | 7.398301 | 9.964224 | 0.742486 | 0.4693 |
| X3^2 | 0.080844 | 0.154790 | 0.522280 | 0.6091 |
| X3\*X6 | -0.073152 | 0.192511 | -0.379987 | 0.7093 |
| X3 | -9.610484 | 7.863141 | -1.222220 | 0.2405 |
| X6^2 | -0.000765 | 0.069224 | -0.011053 | 0.9913 |
| X6 | 1.806366 | 7.275592 | 0.248278 | 0.8073 |
|  |  |  |  |  |
|  |  |  |  |  |
| R-squared | 0.480016 | Mean dependent var | | 38.76705 |
| Adjusted R-squared | -0.005303 | S.D. dependent var | | 39.36260 |
| S.E. of regression | 39.46683 | Akaike info criterion | | 10.49565 |
| Sum squared resid | 23364.46 | Schwarz criterion | | 11.19625 |
| Log likelihood | -142.4348 | Hannan-Quinn criter. | | 10.71978 |
| F-statistic | 0.989073 | Durbin-Watson stat | | 1.753655 |
| Prob(F-statistic) | 0.505764 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

De acuerdo con la Test de White hacemos la siguiente prueba de Hipótesis  
HO: NO EXISTE HETEROCEDASTICIDAD

H1. EXISTE HETEROCEDASTIDAD

Como los P-value son mayores a 0.05 entonces aceptamos la Hipótesis Nula

Por tanto, este modelo NO TIENE HETEROCEDASTICIDAD, quiere decir que cuando las variables exógenas la varianza no cambia en el tiempo.

Si hubiese problemas en los supuestos corrijamos.

1. **Al ejecutar la regresión de la inversión privada y tener en cuenta dos de sus determinantes tuvieron los siguientes resultados.**
2. INFALCIÓN =5.228449-0.828817\*R+0.213205\*PBI

La bondad de ajuste R2=0.941937 Nos dice que el 94% de la fluctuación promedio de Y está siendo explicada por las variables R y PBI.

1. HO: B1=0

H1: B1≠0

Como el P-Value () es mayor a 0.01 entonces aceptamos Ho, ósea la variable R no es significativo.

HO: B2=0

H1: B2≠0