

# Radni materijali: Obrada podataka, testiranja i analize za 4 Ekonometrijska modela

Obrada izvršena softverom Eviews 7.0

## Oznake:

BDP = bruto društveni proizvod, godišnja stopa rasta (%)

INF = stopa inflacije godišnja; (%)

JDPP = javni dug države, procenat BDP: (%)

KE = kurs eura ( RSD za 1 euro); (dinara)

SN = stopa nezaposlenosti (%)

T = vreme kao regresor (diskretne jedinice-godine)

## Podaci:

Podaci su iz baza podataka NBS i RZS

## PODACI

GODINA	BDP	INF	JDPP	KE	SN	T
2001	4.8	40.7	102.2	59.71	12.2	1
2002	4.2	14.8	69.5	61.52	13.3	2
2003	2.5	7.8	64.3	68.31	14.6	3
2004	8.2	13.7	53.3	78.89	18.5	4
2005	6.0	17.7	50.2	85.50	20.8	5
2006	5.6	6.6	36.2	79.00	20.9	6
2007	7.1	11.0	29.4	79.25	18.8	7
2008	5.6	8.6	25.3	88.60	19.8	8
2009	4.0	6.6	31.3	95.89	16.9	9
2010	1.9	10.3	41.4	105.50	20.0	10
2011	3.0	7.7	39.7	104.95	23.6	11
2012	5.0	12.2	61.5	114.06	22.4	12
2013	-1.0	7.8	63.8	114.99	20.1	13
2014	-2.0	2.2	70.9	121.32	17.6	14

## Korelaciona matrica varijabli

	BDP	INF	JDPP	KE	SN	T
BDP	1.000000	0.349059	-0.305192	-0.590975	0.034759	-0.598089
INF		1.000000	0.631797	-0.566470	-0.495627	-0.621674
JDPP			1.000000	-0.216887	-0.600714	-0.285979
KE				1.000000	0.662992	0.979309
SN					1.000000	0.651323
T						1.000000

## Napomena:

Pošto je korelaciona matrica Pirsonon-ovih koeficijenata korelacije simetrična matrica, u cilju bolje preglednosti, izostavljene su vrednosti ispod glavne dijagonale matrice

## MODEL 1.

Dependent Variable: SN

Method: Least Squares

Date: 13/02/15 Time: 20:11

Sample: 1 14

Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	14.24228	3.399634	4.189356	0.0015
KE	0.092509	0.029864	3.097696	0.0101
JDPP	-0.076076	0.028632	-2.657004	0.0223
R-squared	0.658639	Mean dependent var		18.53571
Adjusted R-squared	0.596574	S.D. dependent var		3.329959
S.E. of regression	2.115051	Akaike info criterion		4.523444
Sum squared resid	49.20786	Schwarz criterion		4.660385
Log likelihood	-28.66411	Hannan-Quinn criter.		4.510768
F-statistic	10.61200	Durbin-Watson stat		1.190878
Prob(F-statistic)	0.002708			

## Estimation Command:

```
=====
LS SN C KE JDPP
```

Estimation Equation:

$$SN = C(1) + C(2)*KE + C(3)*JDPP$$

Substituted Coefficients:

$$SN = 14.242 + 0.093*KE - 0.076*JDPP$$

Model nema izražen oriblem multikolinearnosti regresora. Test preko VIF dole

Model nema potvrđenu autokorelaciju prvoga reda, test u nastavku

Prema Breusch-Godfrey Serial testu takođe nije potvrđeno postojanje autokorelacije poremećeje modela.

Model nema heteroskedastičnosti, test po White dole

Test multikolinearnosti

He

Dependent Variable: JDPP

Method: Least Squares

Date: 26/02/15 Time: 12:38

Sample: 1 14

Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	73.10441	27.00841	2.706728	0.0191
KE	-0.226214	0.293922	-0.769640	0.4564
R-squared	0.047040	Mean dependent var		52.78571
Adjusted R-squared	-0.032373	S.D. dependent var		20.98717
S.E. of regression	21.32418	Akaike info criterion		9.089124
Sum squared resid	5456.646	Schwarz criterion		9.180417
Log likelihood	-61.62386	Hannan-Quinn criter.		9.080673
F-statistic	0.592345	Durbin-Watson stat		0.418283
Prob(F-statistic)	0.456397			

$VIF = 1/(1-R^2) = 1/(1 - 0,04704) = 1/0.95296 = 1,0494 < 5$  (nema problema multikolinearnosti u ovom linearnom modelu.

teroskedasticity Test: White

F-statistic	0.995158	Prob. F(2,11)	0.4006
Obs*R-squared	2.145015	Prob. Chi-Square(2)	0.3421
Scaled explained SS	0.846410	Prob. Chi-Square(2)	0.6549

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 24/02/15 Time: 21:08

Sample: 1 14

Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.300953	3.506497	0.656197	0.5252
KE^2	0.000292	0.000321	0.910594	0.3820
JDPP^2	-0.000391	0.000454	-0.862100	0.4070
R-squared	0.153215	Mean dependent var		3.514847
Adjusted R-squared	-0.000745	S.D. dependent var		4.124053
S.E. of regression	4.125590	Akaike info criterion		5.859705
Sum squared resid	187.2254	Schwarz criterion		5.996646
Log likelihood	-38.01793	Hannan-Quinn criter.		5.847028
F-statistic	0.995158	Durbin-Watson stat		2.931678
Prob(F-statistic)	0.400637			

## MODEL 2.

Isto je sve ispitivano kao i za Model 1. Rezultati u Eviews 7.0 slede:

Dependent Variable: BDP  
Method: Least Squares  
Date: 13/02/15 Time: 20:16  
Sample: 1 14  
Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.846067	1.517511	4.511378	0.0009
INF	0.282006	0.078650	3.585557	0.0043
JDPP	-0.119401	0.034324	-3.478682	0.0052

  

R-squared	0.581852	Mean dependent var	3.921429
Adjusted R-squared	0.505825	S.D. dependent var	2.863881
S.E. of regression	2.013239	Akaike info criterion	4.424776
Sum squared resid	44.58444	Schwarz criterion	4.561717
Log likelihood	-27.97343	Hannan-Quinn criter.	4.412100
F-statistic	7.653235	Durbin-Watson stat	1.614310
Prob(F-statistic)	0.008266		

Estimation Command:

```
=====
LS BDP C INF JDPP
```

Estimation Equation:

```
=====
BDP = C(1) + C(2)*INF + C(3)*JDPP
```

Substituted Coefficients:

```
=====
BDP = 6.846 + 0.282*INF - 0.119*JDPP
```

Testiranje prisustva problema multikolinearnosti regresora

Dependent Variable: INF  
Method: Least Squares  
Date: 26/02/15 Time: 12:44  
Sample: 1 14  
Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.575541	5.519963	-0.466587	0.6492
JDPP	0.275721	0.097651	2.823522	0.0154

  

R-squared	0.399167	Mean dependent var	11.97857
Adjusted R-squared	0.349098	S.D. dependent var	9.158953
S.E. of regression	7.389308	Akaike info criterion	6.969509
Sum squared resid	655.2225	Schwarz criterion	7.060803
Log likelihood	-46.78656	Hannan-Quinn criter.	6.961058
F-statistic	7.972274	Durbin-Watson stat	0.940589
Prob(F-statistic)	0.015359		

$VIF = 1/(1-R^2) = 1/(1 - 0,399167) = 1/0,600833 = 1,66436 < 5$  (nema problema multikolinearnosti u ovom linearnom modelu).

Testiranje problema heteroskedastičnosti poremećaja

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.153432	Prob. F(3,8)	0.9246
Obs*R-squared	0.761691	Prob. Chi-Square(3)	0.8586

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 25/02/15 Time: 12:58

Sample: 1 14

Included observations: 14

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.568375	2.154350	-0.263827	0.7986
INF	-0.028580	0.111352	-0.256664	0.8039
JDPP	0.016146	0.053947	0.299283	0.7724
RESID(-1)	0.168853	0.367805	0.459084	0.6584
RESID(-2)	0.139524	0.399002	0.349682	0.7356
RESID(-3)	0.124741	0.551791	0.226065	0.8268

R-squared	0.054407	Mean dependent var	-1.36E-15
Adjusted R-squared	-0.536589	S.D. dependent var	1.851911
S.E. of regression	2.295614	Akaike info criterion	4.797405
Sum squared resid	42.15876	Schwarz criterion	5.071287
Log likelihood	-27.58184	Hannan-Quinn criter.	4.772052
F-statistic	0.092059	Durbin-Watson stat	1.985263
Prob(F-statistic)	0.991145		

Heteroskedasticity Test: White

F-statistic	0.060226	Prob. F(2,11)	0.9419
Obs*R-squared	0.151643	Prob. Chi-Square(2)	0.9270
Scaled explained SS	0.072340	Prob. Chi-Square(2)	0.9645

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 25/02/15 Time: 13:09

Sample: 1 14

Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.860350	2.172823	1.316421	0.2148
INF^2	-0.001717	0.004950	-0.346838	0.7353
JDPP^2	0.000220	0.000809	0.272475	0.7903

R-squared	0.010832	Mean dependent var	3.184603
Adjusted R-squared	-0.169017	S.D. dependent var	4.108432
S.E. of regression	4.442082	Akaike info criterion	6.007533
Sum squared resid	217.0530	Schwarz criterion	6.144473
Log likelihood	-39.05273	Hannan-Quinn criter.	5.994856
F-statistic	0.060226	Durbin-Watson stat	2.538603
Prob(F-statistic)	0.941860		

Test for Equality of Means Between Series

Date: 25/02/15 Time: 13:14

Sample: 1 14

Included observations: 14

Method	df	Value	Probability
Anova F-test	(2, 39)	54.12644	0.0000
Welch F-test*	(2, 19.1497)	39.77572	0.0000

\*Test allows for unequal cell variances

Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	2	19216.67	9608.337
Within	39	6923.144	177.5165
Total	41	26139.82	637.5566

MODEL 3.

Dependent Variable: INF

Method: Least Squares

Date: 25/02/15 Time: 14:27

Sample: 1 14

Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.474753	6.474029	1.309038	0.2172
JDPP	0.215781	0.085648	2.519390	0.0285
T	-1.051512	0.429688	-2.447155	0.0324

R-squared	0.610964	Mean dependent var	11.97857
Adjusted R-squared	0.540230	S.D. dependent var	9.158953
S.E. of regression	6.210349	Akaike info criterion	6.677721
Sum squared resid	424.2528	Schwarz criterion	6.814662
Log likelihood	-43.74404	Hannan-Quinn criter.	6.665044
F-statistic	8.637513	Durbin-Watson stat	1.467369
Prob(F-statistic)	0.005558		

Estimation Command:

```
=====
LS INF C JDPP T
```

Estimation Equation:

```
=====
INF = C(1) + C(2)*JDPP + C(3)*T
```

Substituted Coefficients:

```
=====
INF = 8.474 + 0.216*JDPP - 1.052*T
```

Testiranje postojanja problema multikolinearnosti

Dependent Variable: JDPP

Method: Least Squares

Date: 26/02/15 Time: 12:49

Sample: 1 14  
 Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	63.54615	11.81641	5.377787	0.0002
T	-1.434725	1.387767	-1.033837	0.3216
R-squared	0.081784	Mean dependent var		52.78571
Adjusted R-squared	0.005266	S.D. dependent var		20.98717
S.E. of regression	20.93184	Akaike info criterion		9.051984
Sum squared resid	5257.703	Schwarz criterion		9.143277
Log likelihood	-61.36388	Hannan-Quinn criter.		9.043533
F-statistic	1.068819	Durbin-Watson stat		0.398420
Prob(F-statistic)	0.321598			

$VIF = 1/(1-R^2) = 1/(1 - 0,081784) = 1/0,918216 = 1,0891 < 5$  ( nema problema multikolinearnosti u ovom linearnom modelu.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.461069	Prob. F(3,8)	0.7171
Obs*R-squared	2.063783	Prob. Chi-Square(3)	0.5593

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 25/02/15 Time: 14:57

Sample: 1 14

Included observations: 14

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.908276	7.596872	-0.251192	0.8080
JDPP	0.021302	0.097814	0.217784	0.8330
T	0.129622	0.514416	0.251979	0.8074
RESID(-1)	0.078621	0.384026	0.204729	0.8429
RESID(-2)	-0.421911	0.364818	-1.156499	0.2808
RESID(-3)	0.009065	0.397958	0.022778	0.9824
R-squared	0.147413	Mean dependent var		2.03E-15
Adjusted R-squared	-0.385454	S.D. dependent var		5.712690
S.E. of regression	6.724139	Akaike info criterion		6.946812
Sum squared resid	361.7124	Schwarz criterion		7.220694
Log likelihood	-42.62768	Hannan-Quinn criter.		6.921459
F-statistic	0.276642	Durbin-Watson stat		1.476760
Prob(F-statistic)	0.913406			

Heteroskedasticity Test: White

F-statistic	10.10292	Prob. F(2,11)	0.0032
Obs*R-squared	9.065027	Prob. Chi-Square(2)	0.0108
Scaled explained SS	5.389330	Prob. Chi-Square(2)	0.0676

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 25/02/15 Time: 14:59

Sample: 1 14

Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.710944	15.89542	0.485105	0.6371
JDPP^2	0.011882	0.003056	3.888301	0.0025

T^2	-0.212078	0.122124	-1.736577	0.1103
R-squared	0.647502	Mean dependent var		30.30377
Adjusted R-squared	0.583411	S.D. dependent var		43.64376
S.E. of regression	28.16929	Akaike info criterion		9.701751
Sum squared resid	8728.598	Schwarz criterion		9.838692
Log likelihood	-64.91226	Hannan-Quinn criter.		9.689075
F-statistic	10.10292	Durbin-Watson stat		2.740506
Prob(F-statistic)	0.003231			

#### Test for Equality of Means Between Series

Date: 25/02/15 Time: 15:01

Sample: 1 14

Included observations: 14

Method	df	Value	Probability
Anova F-test	(2, 39)	48.26547	0.0000
Welch F-test*	(2, 20.7506)	30.87947	0.0000

\*Test allows for unequal cell variances

#### Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	2	17435.02	8717.512
Within	39	7044.021	180.6159
Total	41	24479.04	597.0499

#### Category Statistics

Variable	Count	Mean	Std. Dev.	Std. Err. of Mean
INF	14	11.97857	9.158953	2.447833
JDPP	14	52.78571	20.98717	5.609057
T	14	7.500000	4.183300	1.118034
All	42	24.08810	24.43460	3.770341

## MODEL 4.

Dependent Variable: KE

Method: Least Squares

Date: 13/02/15 Time: 21:33

Sample: 1 14

Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	54.49176	2.392624	22.77489	0.0000
T	4.710527	0.280999	16.76348	0.0000
R-squared	0.959046	Mean dependent var		89.82071
Adjusted R-squared	0.955634	S.D. dependent var		20.12189
S.E. of regression	4.238344	Akaike info criterion		5.857786
Sum squared resid	215.5627	Schwarz criterion		5.949080
Log likelihood	-39.00450	Hannan-Quinn criter.		5.849335
F-statistic	281.0141	Durbin-Watson stat		1.449671
Prob(F-statistic)	0.000000			

Estimation Command:

=====

LS KE C T

Estimation Equation:

=====

KE = C(1) + C(2)\*T

Substituted Coefficients:

=====

KE = 54.492 + 4.711\*T

Breusch-Godfrey Serial Correlation LM Test:

=====

F-statistic	1.785318	Prob. F(2,10)	0.2173
Obs*R-squared	3.683609	Prob. Chi-Square(2)	0.1585

=====

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 25/02/15 Time: 20:47

Sample: 1 14

Included observations: 14

Presample missing value lagged residuals set to zero.

=====

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.037381	2.250306	-0.016612	0.9871
T	0.007722	0.264357	0.029209	0.9773
RESID(-1)	0.399480	0.283184	1.410673	0.1887
RESID(-2)	-0.453087	0.283393	-1.598794	0.1409

=====

R-squared	0.263115	Mean dependent var	-5.58E-15
Adjusted R-squared	0.042049	S.D. dependent var	4.072069
S.E. of regression	3.985535	Akaike info criterion	5.838177
Sum squared resid	158.8449	Schwarz criterion	6.020765
Log likelihood	-36.86724	Hannan-Quinn criter.	5.821275
F-statistic	1.190212	Durbin-Watson stat	2.291332
Prob(F-statistic)	0.362384		

=====

Heteroskedasticity Test: White

=====

F-statistic	1.327089	Prob. F(1,12)	0.2718
Obs*R-squared	1.394096	Prob. Chi-Square(1)	0.2377
Scaled explained SS	0.925339	Prob. Chi-Square(1)	0.3361

=====

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 25/02/15 Time: 20:47

Sample: 1 14

Included observations: 14

=====

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	23.01460	8.710045	2.642306	0.0215
T^2	-0.105066	0.091203	-1.151993	0.2718

=====

R-squared	0.099578	Mean dependent var	15.39733
Adjusted R-squared	0.024543	S.D. dependent var	21.47849
S.E. of regression	21.21327	Akaike info criterion	9.078695
Sum squared resid	5400.036	Schwarz criterion	9.169989
Log likelihood	-61.55086	Hannan-Quinn criter.	9.070244
F-statistic	1.327089	Durbin-Watson stat	1.813056
Prob(F-statistic)	0.271758		

=====



Test for Equality of Means Between Series

Date: 25/02/15 Time: 20:48

Sample: 1 14

Included observations: 14

Method	df	Value	Probability
t-test	26	14.98705	0.0000
Satterthwaite-Welch t-test*	14.12167	14.98705	0.0000
Anova F-test	(1, 26)	224.6116	0.0000
Welch F-test*	(1, 14.1217)	224.6116	0.0000

\*Test allows for unequal cell variances

Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	1	47436.90	47436.90
Within	26	5491.076	211.1952
Total	27	52927.98	1960.295

Category Statistics

Variable	Count	Mean	Std. Dev.	Std. Err. of Mean
KE	14	89.82071	20.12189	5.377801
T	14	7.500000	4.183300	1.118034
All	28	48.66036	44.27522	8.367231