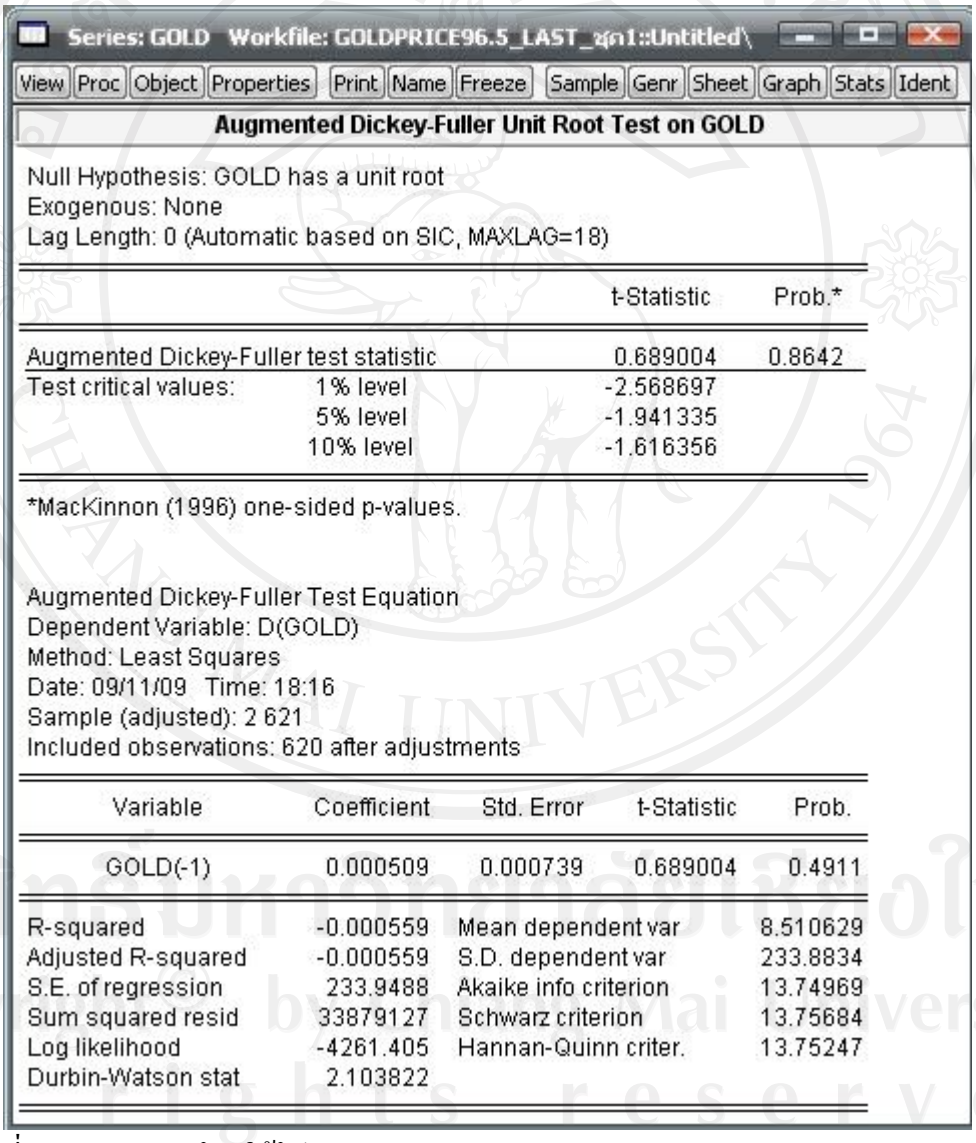
ภาคผนวก

ภาคผนวก ก

ผลการทดสอบ Unit Root Test โดยวิธี Augmented Dickey-Fuller

1) ผลการทดสอบ Unit Root Test ของราคาทองคำ

1.1) Level without intercept and Trend



Series: GOLD Workfile: GOLDPRICE96.5_LAST_ชุด1::Untitled\

View | Proc | Object | Properties | Print | Name | Freeze | Sample | Genr | Sheet | Graph | Stats | Ident

Augmented Dickey-Fuller Unit Root Test on GOLD

Null Hypothesis: GOLD has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=18)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.689004	0.8642
Test critical values:	1% level	-2.568697	
	5% level	-1.941335	
	10% level	-1.616356	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GOLD)
Method: Least Squares
Date: 09/11/09 Time: 18:16
Sample (adjusted): 2 621
Included observations: 620 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GOLD(-1)	0.000509	0.000739	0.689004	0.4911

R-squared	-0.000559	Mean dependent var	8.510629
Adjusted R-squared	-0.000559	S.D. dependent var	233.8834
S.E. of regression	233.9488	Akaike info criterion	13.74969
Sum squared resid	33879127	Schwarz criterion	13.75684
Log likelihood	-4261.405	Hannan-Quinn criter.	13.75247
Durbin-Watson stat	2.103822		

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1.2) Level with intercept

Series: GOLD Workfile: GOLDPRICE96.5_LAST_ชุด1::Untitle...

View | Proc | Object | Properties | Print | Name | Freeze | Sample | Genr | Sheet | Graph | Stats | Ident

Augmented Dickey-Fuller Unit Root Test on GOLD

Null Hypothesis: GOLD has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=18)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.381402	0.5924
Test critical values:	1% level	-3.440668	
	5% level	-2.865984	
	10% level	-2.569195	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GOLD)
Method: Least Squares
Date: 09/11/09 Time: 18:19
Sample (adjusted): 2 621
Included observations: 620 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GOLD(-1)	-0.006810	0.004930	-1.381402	0.1677
C	94.14331	62.69627	1.501577	0.1337

R-squared	0.003078	Mean dependent var	8.510629
Adjusted R-squared	0.001465	S.D. dependent var	233.8834
S.E. of regression	233.7120	Akaike info criterion	13.74928
Sum squared resid	33755970	Schwarz criterion	13.76357
Log likelihood	-4260.276	Hannan-Quinn criter.	13.75483
F-statistic	1.908271	Durbin-Watson stat	2.096097
Prob(F-statistic)	0.167655		

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

1.3) Level with Intercept and Trend

Series: GOLD Workfile: GOLDPRICE96.5_LAST_ชุด1::Untitled\

View | Proc | Object | Properties | Print | Name | Freeze | Sample | Genr | Sheet | Graph | Stats | Ident

Augmented Dickey-Fuller Unit Root Test on GOLD

Null Hypothesis: GOLD has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=18)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.229004	0.0797
Test critical values:	1% level	-3.972925	
	5% level	-3.417083	
	10% level	-3.130918	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GOLD)
Method: Least Squares
Date: 09/11/09 Time: 18:21
Sample (adjusted): 2 621
Included observations: 620 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GOLD(-1)	-0.032930	0.010198	-3.229004	0.0013
C	324.2074	100.4459	3.227682	0.0013
@TREND(1)	0.316825	0.108485	2.920436	0.0036

R-squared	0.016671	Mean dependent var	8.510629
Adjusted R-squared	0.013484	S.D. dependent var	233.8834
S.E. of regression	232.3013	Akaike info criterion	13.73877
Sum squared resid	33295715	Schwarz criterion	13.76021
Log likelihood	-4256.020	Hannan-Quinn criter.	13.74711
F-statistic	5.230233	Durbin-Watson stat	2.070242
Prob(F-statistic)	0.005592		

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

1.4) 1st Difference without Intercept and Trend

Series: GOLD Workfile: GOLDPRICE96.5_LAST_ชุด1::Untitled\

View | Proc | Object | Properties | Print | Name | Freeze | Sample | Genr | Sheet | Graph | Stats | Ident

Augmented Dickey-Fuller Unit Root Test on D(GOLD)

Null Hypothesis: D(GOLD) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=18)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-26.15024	0.0000
Test critical values:	1% level	-2.568703	
	5% level	-1.941335	
	10% level	-1.616355	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GOLD,2)
Method: Least Squares
Date: 09/11/09 Time: 18:26
Sample (adjusted): 3 621
Included observations: 619 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GOLD(-1))	-1.050580	0.040175	-26.15024	0.0000

R-squared	0.525285	Mean dependent var	0.037932
Adjusted R-squared	0.525285	S.D. dependent var	339.5203
S.E. of regression	233.9279	Akaike info criterion	13.74952
Sum squared resid	33818366	Schwarz criterion	13.75667
Log likelihood	-4254.476	Hannan-Quinn criter.	13.75230
Durbin-Watson stat	2.005947		

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

1.5) 1st Difference with Intercept

Series: GOLD Workfile: GOLDPRICE96.5_LAST_ชุด1::Untitled\

View | Proc | Object | Properties | Print | Name | Freeze | Sample | Genr | Sheet | Graph | Stats | Ident

Augmented Dickey-Fuller Unit Root Test on D(GOLD)

Null Hypothesis: D(GOLD) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=18)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-26.16562	0.0000
Test critical values:	1% level	-3.440685	
	5% level	-2.865991	
	10% level	-2.569199	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GOLD,2)
Method: Least Squares
Date: 09/11/09 Time: 18:27
Sample (adjusted): 3 621
Included observations: 619 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GOLD(-1))	-1.051968	0.040204	-26.16562	0.0000
C	8.962245	9.409247	0.952493	0.3412

R-squared	0.525982	Mean dependent var	0.037932
Adjusted R-squared	0.525214	S.D. dependent var	339.5203
S.E. of regression	233.9455	Akaike info criterion	13.75128
Sum squared resid	33768712	Schwarz criterion	13.76559
Log likelihood	-4254.021	Hannan-Quinn criter.	13.75684
F-statistic	684.6396	Durbin-Watson stat	2.006307
Prob(F-statistic)	0.000000		

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1.6) 1st Difference with Intercept and Trend

Series: GOLD Workfile: GOLDPRICE96.5_LAST_ชุด1::Untitled\

View | Proc | Object | Properties | Print | Name | Freeze | Sample | Genr | Sheet | Graph | Stats | Ident

Augmented Dickey-Fuller Unit Root Test on D(GOLD)

Null Hypothesis: D(GOLD) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=18)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-26.14587	0.0000
Test critical values:	1% level	-3.972949	
	5% level	-3.417095	
	10% level	-3.130925	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GOLD,2)
Method: Least Squares
Date: 09/11/09 Time: 18:27
Sample (adjusted): 3 621
Included observations: 619 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GOLD(-1))	-1.052024	0.040237	-26.14587	0.0000
C	5.839424	18.89063	0.309118	0.7573
@TREND(1)	0.010043	0.052665	0.190691	0.8488

R-squared	0.526010	Mean dependent var	0.037932
Adjusted R-squared	0.524472	S.D. dependent var	339.5203
S.E. of regression	234.1284	Akaike info criterion	13.75445
Sum squared resid	33766719	Schwarz criterion	13.77591
Log likelihood	-4254.003	Hannan-Quinn criter.	13.76279
F-statistic	341.8033	Durbin-Watson stat	2.006323
Prob(F-statistic)	0.000000		

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1.7) 2nd Difference without Intercept and Trend

Series: GOLD Workfile: GOLDPRICE96.5_LAST_สุด1::Untitled\

View | Proc | Object | Properties | Print | Name | Freeze | Sample | Genr | Sheet | Graph | Stats | Ident

Augmented Dickey-Fuller Unit Root Test on D(GOLD,2)

Null Hypothesis: D(GOLD,2) has a unit root
Exogenous: None
Lag Length: 8 (Automatic based on SIC, MAXLAG=18)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-14.98703	0.0000
Test critical values:	1% level	-2.568758	
	5% level	-1.941343	
	10% level	-1.616350	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GOLD,3)
Method: Least Squares
Date: 09/11/09 Time: 18:28
Sample (adjusted): 12 621
Included observations: 610 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GOLD(-1),2)	-6.118744	0.408269	-14.98703	0.0000
D(GOLD(-1),3)	4.177056	0.388044	10.76440	0.0000
D(GOLD(-2),3)	3.282839	0.352434	9.314768	0.0000
D(GOLD(-3),3)	2.480443	0.307013	8.079272	0.0000
D(GOLD(-4),3)	1.801388	0.255333	7.055049	0.0000
D(GOLD(-5),3)	1.261353	0.198903	6.341557	0.0000
D(GOLD(-6),3)	0.755830	0.142020	5.321997	0.0000
D(GOLD(-7),3)	0.350015	0.087838	3.984795	0.0001
D(GOLD(-8),3)	0.129083	0.040442	3.191766	0.0015

R-squared	0.827195	Mean dependent var	-1.187082
Adjusted R-squared	0.824895	S.D. dependent var	588.7338
S.E. of regression	246.3590	Akaike info criterion	13.86610
Sum squared resid	36476359	Schwarz criterion	13.93122
Log likelihood	-4220.161	Hannan-Quinn criter.	13.89143
Durbin-Watson stat	2.003725		

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1.8) 2nd Difference with Intercept

Series: GOLD Workfile: GOLDPRICE96.5_LAST_สุด1::Untitled\

View | Proc | Object | Properties | Print | Name | Freeze | Sample | Genr | Sheet | Graph | Stats | Ident

Augmented Dickey-Fuller Unit Root Test on D(GOLD,2)

Null Hypothesis: D(GOLD,2) has a unit root
Exogenous: Constant
Lag Length: 8 (Automatic based on SIC, MAXLAG=18)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-14.97459	0.0000
Test critical values:	1% level	-3.440841	
	5% level	-2.866060	
	10% level	-2.569236	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GOLD,3)
Method: Least Squares
Date: 09/11/09 Time: 18:30
Sample (adjusted): 12 621
Included observations: 610 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GOLD(-1),2)	-6.118742	0.408608	-14.97459	0.0000
D(GOLD(-1),3)	4.177047	0.388366	10.75544	0.0000
D(GOLD(-2),3)	3.282824	0.352727	9.306993	0.0000
D(GOLD(-3),3)	2.480426	0.307268	8.072507	0.0000
D(GOLD(-4),3)	1.801374	0.255545	7.049133	0.0000
D(GOLD(-5),3)	1.261343	0.199068	6.336239	0.0000
D(GOLD(-6),3)	0.755824	0.142138	5.317532	0.0000
D(GOLD(-7),3)	0.350010	0.087911	3.981433	0.0001
D(GOLD(-8),3)	0.129080	0.040476	3.189053	0.0015
C	0.530952	9.983175	0.053185	0.9576

R-squared	0.827196	Mean dependent var	-1.187082
Adjusted R-squared	0.824604	S.D. dependent var	588.7338
S.E. of regression	246.5637	Akaike info criterion	13.86938
Sum squared resid	36476187	Schwarz criterion	13.94173
Log likelihood	-4220.159	Hannan-Quinn criter.	13.89752
F-statistic	319.1265	Durbin-Watson stat	2.003720
Prob(F-statistic)	0.000000		

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

1.9) 2nd Difference with Intercept and Trend

Series: GOLD Workfile: GOLDPRICE96.5_LAST_สุด1::Untitled\

View | Proc | Object | Properties | Print | Name | Freeze | Sample | Genr | Sheet | Graph | Stats | Ident

Augmented Dickey-Fuller Unit Root Test on D(GOLD,2)

Null Hypothesis: D(GOLD,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 8 (Automatic based on SIC, MAXLAG=18)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-14.96280	0.0000
Test critical values:	1% level	-3.973170	
	5% level	-3.417203	
	10% level	-3.130989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GOLD,3)
Method: Least Squares
Date: 09/11/09 Time: 18:31
Sample (adjusted): 12 621
Included observations: 610 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GOLD(-1),2)	-6.119075	0.408953	-14.96280	0.0000
D(GOLD(-1),3)	4.177363	0.388693	10.74720	0.0000
D(GOLD(-2),3)	3.283104	0.353023	9.299961	0.0000
D(GOLD(-3),3)	2.480668	0.307527	8.066509	0.0000
D(GOLD(-4),3)	1.801576	0.255760	7.043998	0.0000
D(GOLD(-5),3)	1.261489	0.199235	6.331663	0.0000
D(GOLD(-6),3)	0.755920	0.142257	5.313767	0.0000
D(GOLD(-7),3)	0.350063	0.087984	3.978722	0.0001
D(GOLD(-8),3)	0.129094	0.040509	3.186774	0.0015
C	-1.703287	20.50118	-0.083082	0.9338
@TREND(1)	0.007082	0.056741	0.124806	0.9007

R-squared	0.827200	Mean dependent var	-1.187082
Adjusted R-squared	0.824316	S.D. dependent var	588.7338
S.E. of regression	246.7662	Akaike info criterion	13.87263
Sum squared resid	36475238	Schwarz criterion	13.95221
Log likelihood	-4220.151	Hannan-Quinn criter.	13.90359
F-statistic	286.7442	Durbin-Watson stat	2.003740
Prob(F-statistic)	0.000000		

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ภาคผนวก ข

การประมาณค่าพารามิเตอร์จากแบบจำลอง

1) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA (0,2,1)

Equation: UNTITLED Workfile: GOLDPRICE96.5_LAS...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: Least Squares
Date: 08/29/09 Time: 14:40
Sample (adjusted): 3 621
Included observations: 619 after adjustments
Convergence achieved after 21 iterations
MA Backcast: OFF (Roots of MA process too large)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.020960	0.007791	2.690476	0.0073
MA(1)	-1.012555	0.012595	-80.39104	0.0000

R-squared	0.531533	Mean dependent var	0.037932
Adjusted R-squared	0.530774	S.D. dependent var	339.5203
S.E. of regression	232.5717	Akaike info criterion	13.73950
Sum squared resid	33373278	Schwarz criterion	13.75381
Log likelihood	-4250.375	Hannan-Quinn criter.	13.74506
F-statistic	700.0625	Durbin-Watson stat	2.107146
Prob(F-statistic)	0.000000		

Inverted MA Roots 1.01
Estimated MA process is noninvertible

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

2) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA (1,2,2)

Equation: UNTITLED Workfile: GOLDPRICE96.5_LAS...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: Least Squares
Date: 08/29/09 Time: 15:21
Sample (adjusted): 4 621
Included observations: 618 after adjustments
Convergence achieved after 14 iterations
MA Backcast: 2 3

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.015342	0.068419	0.224232	0.8227
AR(1)	-0.997020	0.004350	-229.1900	0.0000
MA(2)	-0.991616	0.003645	-272.0325	0.0000

R-squared	0.522904	Mean dependent var	-0.235259
Adjusted R-squared	0.521352	S.D. dependent var	339.7273
S.E. of regression	235.0382	Akaike info criterion	13.76222
Sum squared resid	33974430	Schwarz criterion	13.78370
Log likelihood	-4249.525	Hannan-Quinn criter.	13.77057
F-statistic	337.0238	Durbin-Watson stat	2.100701
Prob(F-statistic)	0.000000		

Inverted AR Roots	-1.00	
Inverted MA Roots	1.00	-1.00

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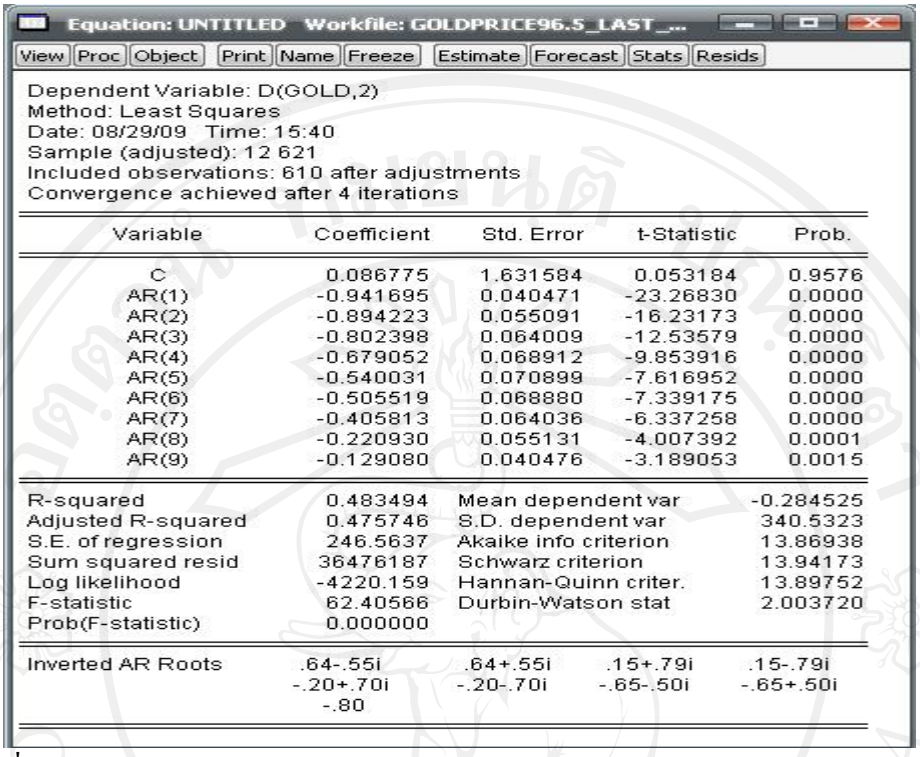
3) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA (9,2,0)



Equation: UNTITLED Workfile: GOLDPRICE96.5_LAST_...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: Least Squares
Date: 08/29/09 Time: 15:40
Sample (adjusted): 12 621
Included observations: 610 after adjustments
Convergence achieved after 4 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.086775	1.631584	0.053184	0.9576
AR(1)	-0.941695	0.040471	-23.26830	0.0000
AR(2)	-0.894223	0.055091	-16.23173	0.0000
AR(3)	-0.802398	0.064009	-12.53579	0.0000
AR(4)	-0.679052	0.068912	-9.853916	0.0000
AR(5)	-0.540031	0.070899	-7.616952	0.0000
AR(6)	-0.505519	0.068880	-7.339175	0.0000
AR(7)	-0.405813	0.064036	-6.337258	0.0000
AR(8)	-0.220930	0.055131	-4.007392	0.0001
AR(9)	-0.129080	0.040476	-3.189053	0.0015

R-squared	0.483494	Mean dependent var	-0.284525
Adjusted R-squared	0.475746	S.D. dependent var	340.5323
S.E. of regression	246.5637	Akaike info criterion	13.86938
Sum squared resid	36476187	Schwarz criterion	13.94173
Log likelihood	-4220.159	Hannan-Quinn criter.	13.89752
F-statistic	62.40566	Durbin-Watson stat	2.003720
Prob(F-statistic)	0.000000		

Inverted AR Roots	.64-.55i	.64+.55i	.15+.79i	.15-.79i
	-.20+.70i	-.20-.70i	-.65-.50i	-.65+.50i
	-.80			

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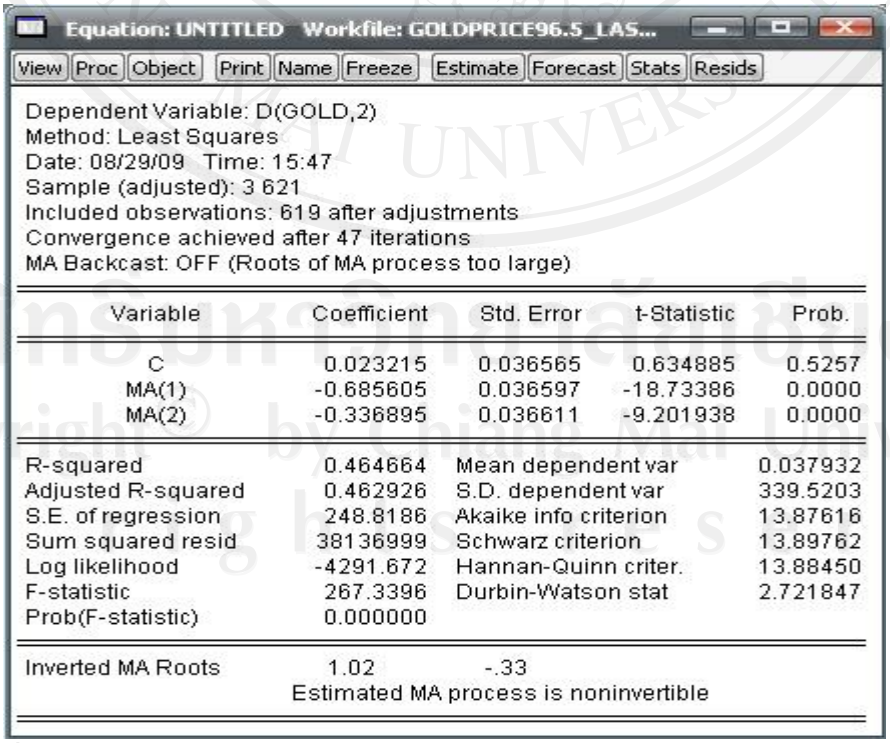
4) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA (0,2,2)



Equation: UNTITLED Workfile: GOLDPRICE96.5_LAS...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: Least Squares
Date: 08/29/09 Time: 15:47
Sample (adjusted): 3 621
Included observations: 619 after adjustments
Convergence achieved after 47 iterations
MA Backcast: OFF (Roots of MA process too large)

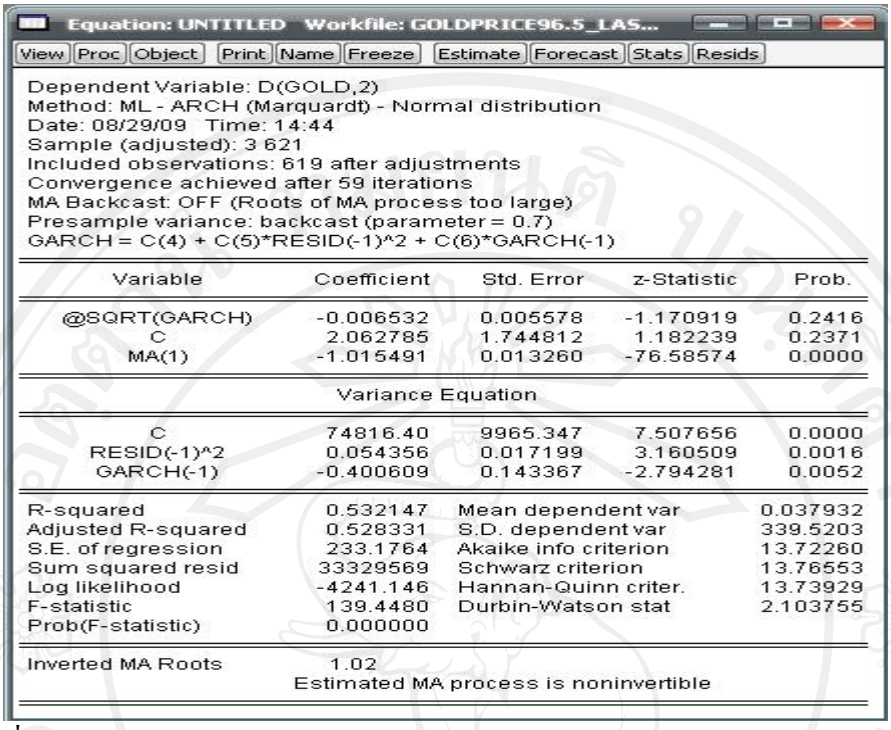
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.023215	0.036565	0.634885	0.5257
MA(1)	-0.685605	0.036597	-18.73386	0.0000
MA(2)	-0.336895	0.036611	-9.201938	0.0000

R-squared	0.464664	Mean dependent var	0.037932
Adjusted R-squared	0.462926	S.D. dependent var	339.5203
S.E. of regression	248.8186	Akaike info criterion	13.87616
Sum squared resid	38136999	Schwarz criterion	13.89762
Log likelihood	-4291.672	Hannan-Quinn criter.	13.88450
F-statistic	267.3396	Durbin-Watson stat	2.721847
Prob(F-statistic)	0.000000		

Inverted MA Roots	1.02	-.33
	Estimated MA process is noninvertible	

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

5) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA with GARCH-M(0,2,1)



Equation: UNTITLED Workfile: GOLDPRICE96.5_LAS...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 08/29/09 Time: 14:44
Sample (adjusted): 3 621
Included observations: 619 after adjustments
Convergence achieved after 59 iterations
MA Backcast: OFF (Roots of MA process too large)
Presample variance: backcast (parameter = 0.7)
GARCH = C(4) + C(5)*RESID(-1)^2 + C(6)*GARCH(-1)

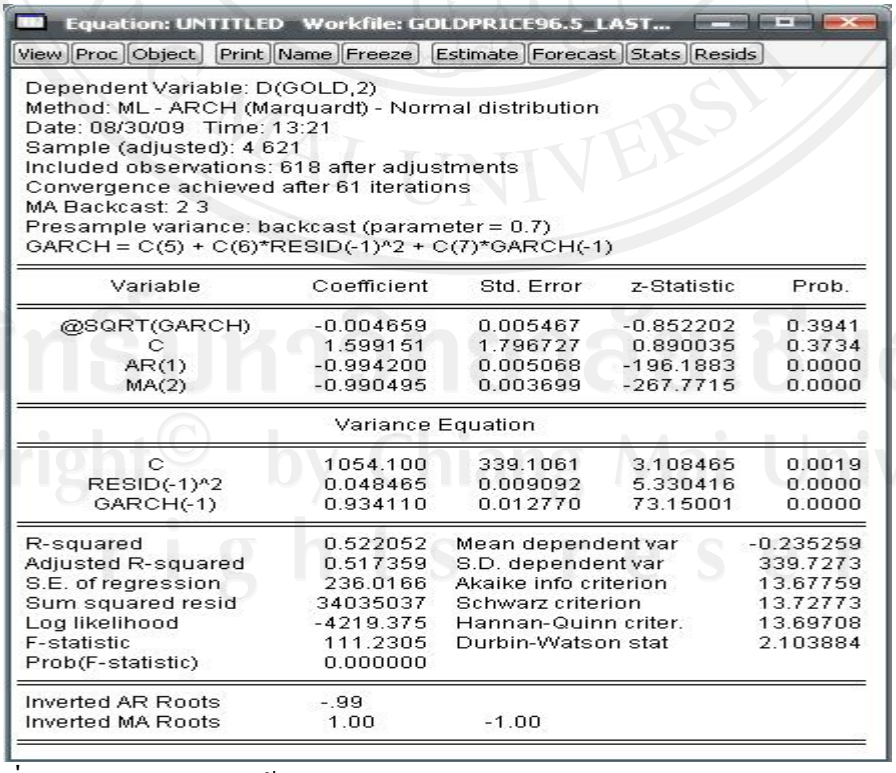
Variable	Coefficient	Std. Error	z-Statistic	Prob.
@SQRT(GARCH)	-0.006532	0.005578	-1.170919	0.2416
C	2.062785	1.744812	1.182239	0.2371
MA(1)	-1.015491	0.013260	-76.58574	0.0000
Variance Equation				
C	74816.40	9965.347	7.507656	0.0000
RESID(-1)^2	0.054356	0.017199	3.160509	0.0016
GARCH(-1)	-0.400609	0.143367	-2.794281	0.0052

R-squared	0.532147	Mean dependent var	0.037932
Adjusted R-squared	0.528331	S.D. dependent var	339.5203
S.E. of regression	233.1764	Akaike info criterion	13.72260
Sum squared resid	33329569	Schwarz criterion	13.76553
Log likelihood	-4241.146	Hannan-Quinn criter.	13.73929
F-statistic	139.4480	Durbin-Watson stat	2.103755
Prob(F-statistic)	0.000000		

Inverted MA Roots 1.02
Estimated MA process is noninvertible

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

6) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA with GARCH-M(1,2,2)



Equation: UNTITLED Workfile: GOLDPRICE96.5_LAST...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 08/30/09 Time: 13:21
Sample (adjusted): 4 621
Included observations: 618 after adjustments
Convergence achieved after 61 iterations
MA Backcast: 2 3
Presample variance: backcast (parameter = 0.7)
GARCH = C(5) + C(6)*RESID(-1)^2 + C(7)*GARCH(-1)

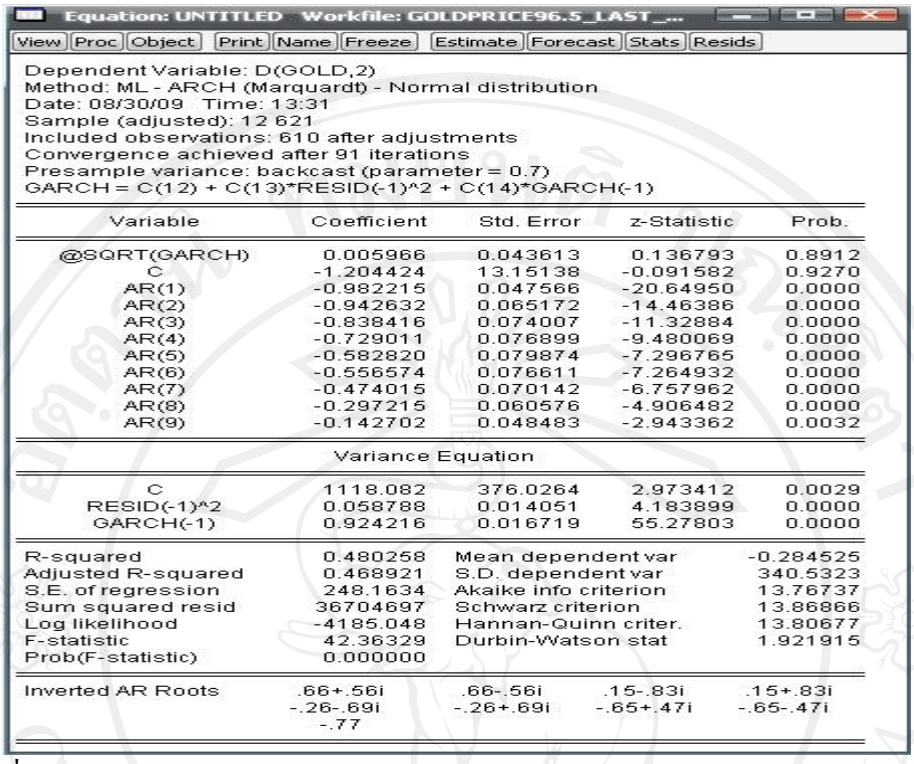
Variable	Coefficient	Std. Error	z-Statistic	Prob.
@SQRT(GARCH)	-0.004659	0.005467	-0.852202	0.3941
C	1.599151	1.796727	0.890035	0.3734
AR(1)	-0.994200	0.005068	-196.1883	0.0000
MA(2)	-0.990495	0.003699	-267.7715	0.0000
Variance Equation				
C	1054.100	339.1061	3.108465	0.0019
RESID(-1)^2	0.048465	0.009092	5.330416	0.0000
GARCH(-1)	0.934110	0.012770	73.15001	0.0000

R-squared	0.522052	Mean dependent var	-0.235259
Adjusted R-squared	0.517359	S.D. dependent var	339.7273
S.E. of regression	236.0166	Akaike info criterion	13.67759
Sum squared resid	34035037	Schwarz criterion	13.72773
Log likelihood	-4219.375	Hannan-Quinn criter.	13.69708
F-statistic	111.2305	Durbin-Watson stat	2.103884
Prob(F-statistic)	0.000000		

Inverted AR Roots -.99
Inverted MA Roots 1.00 -1.00

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

7) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA with GARCH-M(9,2,0)



Equation: UNTITLED Workfile: GOLDPRICE96.5_LAST_...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 08/30/09 Time: 13:31
Sample (adjusted): 12 621
Included observations: 610 after adjustments
Convergence achieved after 91 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(12) + C(13)*RESID(-1)^2 + C(14)*GARCH(-1)

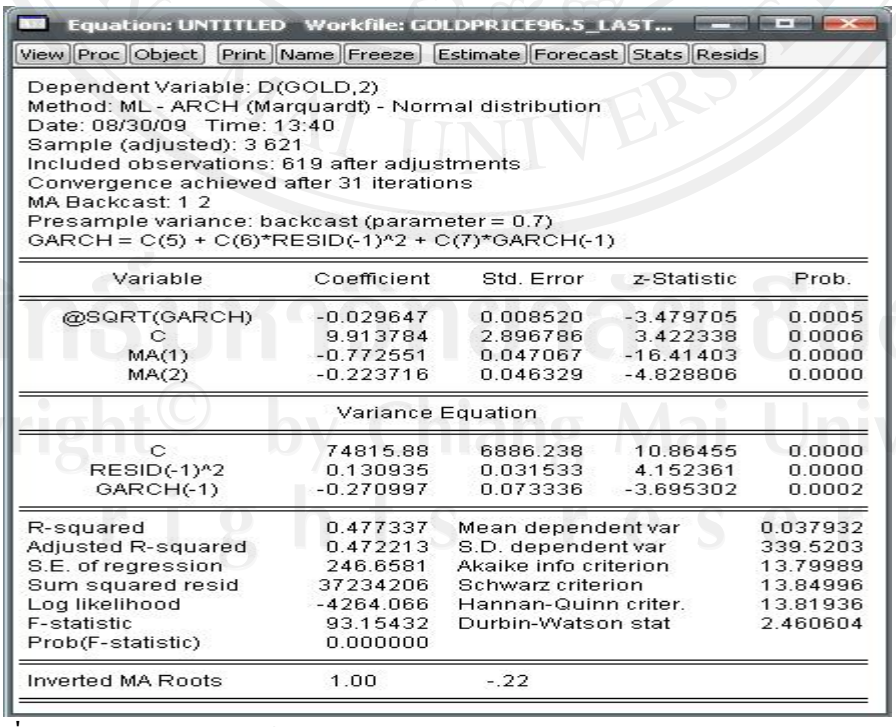
Variable	Coefficient	Std. Error	z-Statistic	Prob.
@SQRT(GARCH)	0.005966	0.043613	0.136793	0.8912
C	-1.204424	13.15138	-0.091582	0.9270
AR(1)	-0.982215	0.047566	-20.64950	0.0000
AR(2)	-0.942632	0.065172	-14.46386	0.0000
AR(3)	-0.838416	0.074007	-11.32884	0.0000
AR(4)	-0.729011	0.076899	-9.480069	0.0000
AR(5)	-0.582820	0.079874	-7.296765	0.0000
AR(6)	-0.556574	0.076611	-7.264932	0.0000
AR(7)	-0.474015	0.070142	-6.757962	0.0000
AR(8)	-0.297215	0.060576	-4.906482	0.0000
AR(9)	-0.142702	0.048483	-2.943362	0.0032
Variance Equation				
C	1118.082	376.0264	2.973412	0.0029
RESID(-1)^2	0.058788	0.014051	4.183899	0.0000
GARCH(-1)	0.924216	0.016719	55.27803	0.0000

R-squared	0.480258	Mean dependent var	-0.284525
Adjusted R-squared	0.468921	S.D. dependent var	340.5323
S.E. of regression	248.1634	Akaike info criterion	13.76737
Sum squared resid	36704697	Schwarz criterion	13.86866
Log likelihood	-4185.048	Hannan-Quinn criter.	13.80677
F-statistic	42.36329	Durbin-Watson stat	1.921915
Prob(F-statistic)	0.000000		

Inverted AR Roots	.66+.56i	.66-.56i	.15-.83i	.15+.83i
	-.26-.69i	-.26+.69i	-.65+.47i	-.65-.47i
	-.77			

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

8) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA with GARCH-M(0,2,2)



Equation: UNTITLED Workfile: GOLDPRICE96.5_LAST...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 08/30/09 Time: 13:40
Sample (adjusted): 3 621
Included observations: 619 after adjustments
Convergence achieved after 31 iterations
MA Backcast: 1 2
Presample variance: backcast (parameter = 0.7)
GARCH = C(5) + C(6)*RESID(-1)^2 + C(7)*GARCH(-1)

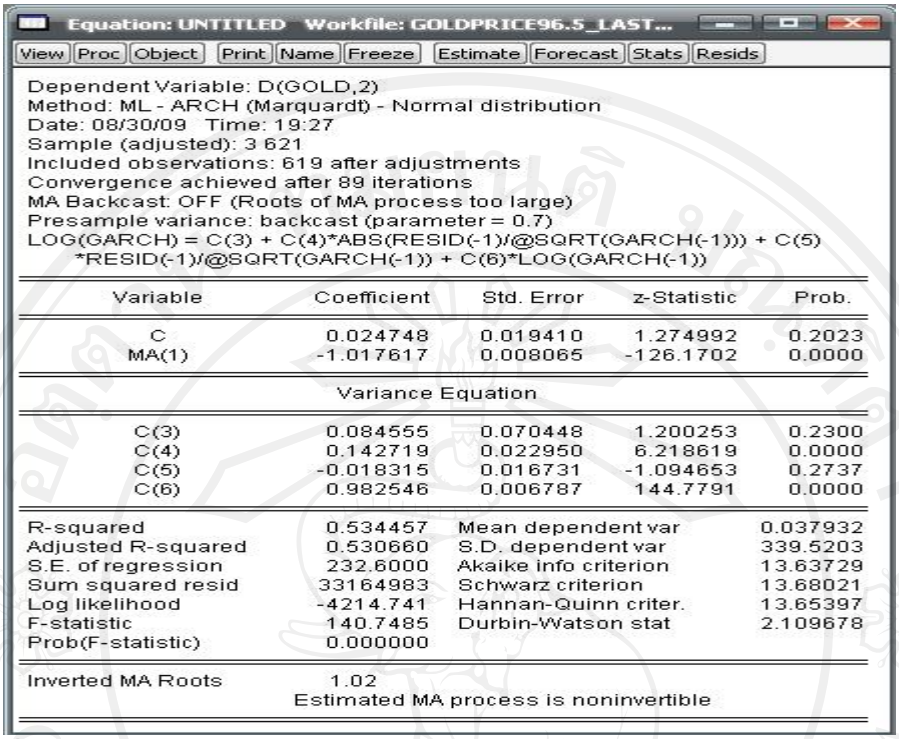
Variable	Coefficient	Std. Error	z-Statistic	Prob.
@SQRT(GARCH)	-0.029647	0.008520	-3.479705	0.0005
C	9.913784	2.896786	3.422338	0.0006
MA(1)	-0.772551	0.047067	-16.41403	0.0000
MA(2)	-0.223716	0.046329	-4.828806	0.0000
Variance Equation				
C	74815.88	6886.238	10.86455	0.0000
RESID(-1)^2	0.130935	0.031533	4.152361	0.0000
GARCH(-1)	-0.270997	0.073336	-3.695302	0.0002

R-squared	0.477337	Mean dependent var	0.037932
Adjusted R-squared	0.472213	S.D. dependent var	339.5203
S.E. of regression	246.6581	Akaike info criterion	13.79989
Sum squared resid	37234206	Schwarz criterion	13.84996
Log likelihood	-4264.066	Hannan-Quinn criter.	13.81936
F-statistic	93.15432	Durbin-Watson stat	2.460604
Prob(F-statistic)	0.000000		

Inverted MA Roots	1.00	-.22

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

9) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA with E-GARCH(0,2,1)



Equation: UNTITLED Workfile: GOLDPRICE96.5_LAST...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 08/30/09 Time: 19:27
Sample (adjusted): 3 621
Included observations: 619 after adjustments
Convergence achieved after 89 iterations
MA Backcast: OFF (Roots of MA process too large)
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1))

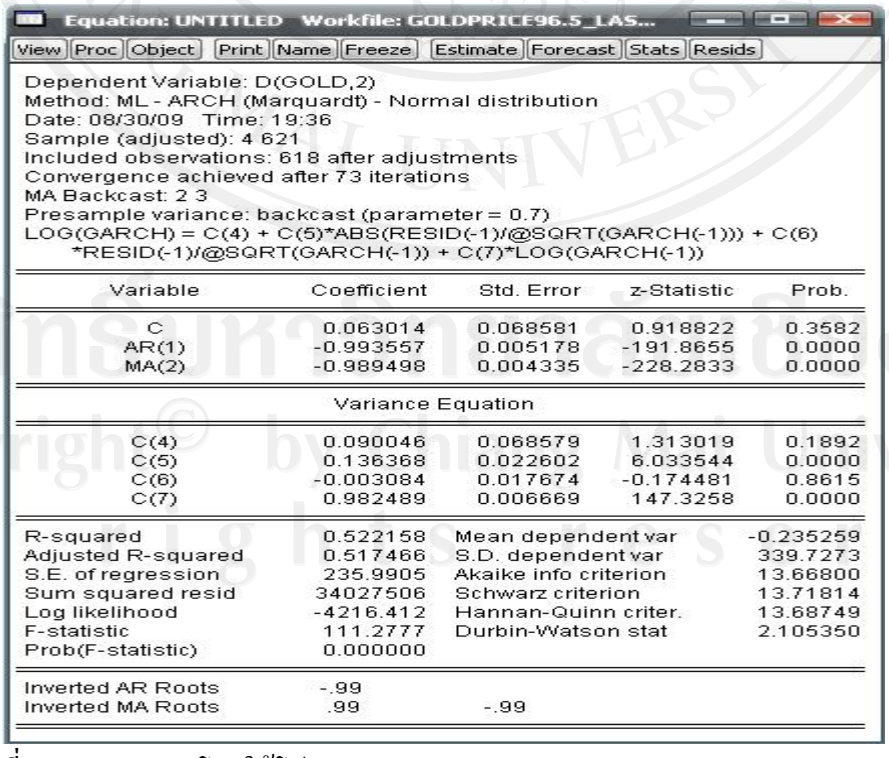
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.024748	0.019410	1.274992	0.2023
MA(1)	-1.017617	0.008065	-126.1702	0.0000
Variance Equation				
C(3)	0.084555	0.070448	1.200253	0.2300
C(4)	0.142719	0.022950	6.218619	0.0000
C(5)	-0.018315	0.016731	-1.094653	0.2737
C(6)	0.982546	0.006787	144.7791	0.0000

R-squared	0.534457	Mean dependent var	0.037932
Adjusted R-squared	0.530660	S.D. dependent var	339.5203
S.E. of regression	232.6000	Akaike info criterion	13.63729
Sum squared resid	33164983	Schwarz criterion	13.68021
Log likelihood	-4214.741	Hannan-Quinn criter.	13.65397
F-statistic	140.7485	Durbin-Watson stat	2.109678
Prob(F-statistic)	0.000000		

Inverted MA Roots 1.02
Estimated MA process is noninvertible

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

10) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA with E-GARCH(1,2,2)



Equation: UNTITLED Workfile: GOLDPRICE96.5_LAS...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 08/30/09 Time: 19:36
Sample (adjusted): 4 621
Included observations: 618 after adjustments
Convergence achieved after 73 iterations
MA Backcast: 2 3
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(4) + C(5)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(6)
*RESID(-1)/@SQRT(GARCH(-1)) + C(7)*LOG(GARCH(-1))

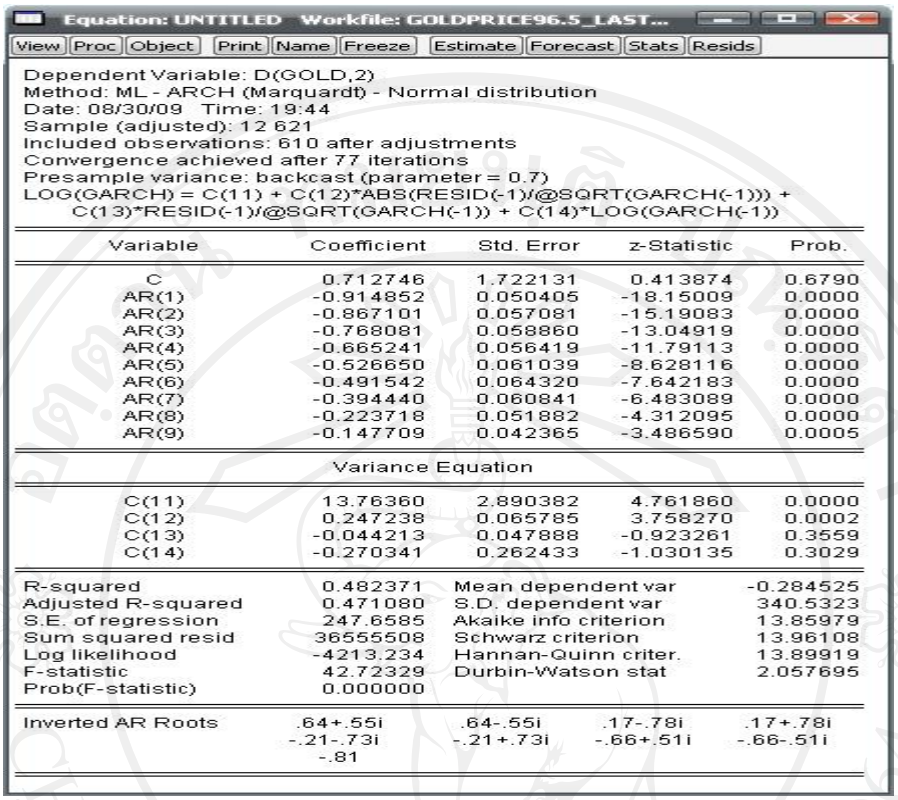
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.063014	0.068581	0.918822	0.3582
AR(1)	-0.993557	0.005178	-191.8655	0.0000
MA(2)	-0.989498	0.004335	-228.2833	0.0000
Variance Equation				
C(4)	0.090046	0.068579	1.313019	0.1892
C(5)	0.136368	0.022602	6.033544	0.0000
C(6)	-0.003084	0.017674	-0.174481	0.8615
C(7)	0.982489	0.006669	147.3258	0.0000

R-squared	0.522158	Mean dependent var	-0.235259
Adjusted R-squared	0.517466	S.D. dependent var	339.7273
S.E. of regression	235.9905	Akaike info criterion	13.66800
Sum squared resid	34027506	Schwarz criterion	13.71814
Log likelihood	-4216.412	Hannan-Quinn criter.	13.68749
F-statistic	111.2777	Durbin-Watson stat	2.105350
Prob(F-statistic)	0.000000		

Inverted AR Roots -.99
Inverted MA Roots .99 -.99

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

11) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA with E-GARCH(9,2,0)



Equation: UNTITLED Workfile: GOLDPRICE96.5_LAST...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 08/30/09 Time: 19:44
Sample (adjusted): 12 621
Included observations: 610 after adjustments
Convergence achieved after 77 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(11) + C(12)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(13)*RESID(-1)/@SQRT(GARCH(-1)) + C(14)*LOG(GARCH(-1))

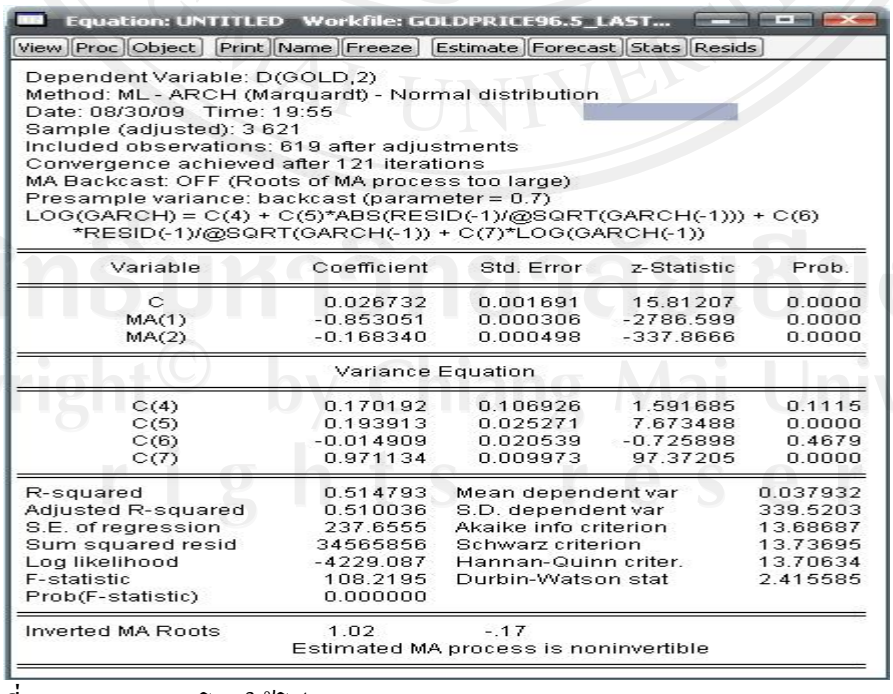
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.712746	1.722131	0.413874	0.6790
AR(1)	-0.914852	0.050405	-18.15009	0.0000
AR(2)	-0.867101	0.057081	-15.19083	0.0000
AR(3)	-0.768081	0.058860	-13.04919	0.0000
AR(4)	-0.665241	0.056419	-11.79113	0.0000
AR(5)	-0.526650	0.061039	-8.628116	0.0000
AR(6)	-0.491542	0.064320	-7.642183	0.0000
AR(7)	-0.394440	0.060841	-6.483089	0.0000
AR(8)	-0.223718	0.051882	-4.312095	0.0000
AR(9)	-0.147709	0.042365	-3.486590	0.0005
Variance Equation				
C(11)	13.76360	2.890382	4.761860	0.0000
C(12)	0.247238	0.065785	3.758270	0.0002
C(13)	-0.044213	0.047888	-0.923261	0.3559
C(14)	-0.270341	0.262433	-1.030135	0.3029

R-squared	0.482371	Mean dependent var	-0.284525
Adjusted R-squared	0.471080	S.D. dependent var	340.5323
S.E. of regression	247.6585	Akaike info criterion	13.85979
Sum squared resid	36555508	Schwarz criterion	13.96108
Log likelihood	-4213.234	Hannan-Quinn criter.	13.89919
F-statistic	42.72329	Durbin-Watson stat	2.057695
Prob(F-statistic)	0.000000		

Inverted AR Roots	.64+.55i	.64-.55i	.17-.78i	.17+.78i
	-.21-.73i	-.21+.73i	-.66+.51i	-.66-.51i
	-.81			

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

12) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA with E-GARCH(0,2,2)



Equation: UNTITLED Workfile: GOLDPRICE96.5_LAST...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 08/30/09 Time: 19:55
Sample (adjusted): 3 621
Included observations: 619 after adjustments
Convergence achieved after 121 iterations
MA Backcast: OFF (Roots of MA process too large)
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(4) + C(5)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(6)*RESID(-1)/@SQRT(GARCH(-1)) + C(7)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.026732	0.001691	15.81207	0.0000
MA(1)	-0.853051	0.000306	-2786.599	0.0000
MA(2)	-0.168340	0.000498	-337.8666	0.0000
Variance Equation				
C(4)	0.170192	0.106926	1.591685	0.1115
C(5)	0.193913	0.025271	7.673488	0.0000
C(6)	-0.014909	0.020539	-0.725898	0.4679
C(7)	0.971134	0.009973	97.37205	0.0000

R-squared	0.514793	Mean dependent var	0.037932
Adjusted R-squared	0.510036	S.D. dependent var	339.5203
S.E. of regression	237.6555	Akaike info criterion	13.68687
Sum squared resid	34565856	Schwarz criterion	13.73695
Log likelihood	-4229.087	Hannan-Quinn criter.	13.70634
F-statistic	108.2195	Durbin-Watson stat	2.415585
Prob(F-statistic)	0.000000		

Inverted MA Roots	1.02	-.17
	Estimated MA process is noninvertible	

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

13) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA with GJR(0,2,1)

Equation: UNTITLED Workfile: GOLDPRICE96.5_LAST_ชุ...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 08/30/09 Time: 23:52
Sample (adjusted): 3 621
Included observations: 619 after adjustments
Convergence not achieved after 500 iterations
MA Backcast: OFF (Roots of MA process too large)
Presample variance: backcast (parameter = 0.7)
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*RESID(-1)^2*(RESID(-1)<0) + C(6)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.035140	0.062138	0.565513	0.5717
MA(1)	-1.020564	0.013313	-76.66143	0.0000
Variance Equation				
C	74802.28	9493.592	7.879240	0.0000
RESID(-1)^2	0.046025	0.013689	3.362222	0.0008
RESID(-1)^2*(RESID(-1)<0)	0.046885	0.033145	1.414539	0.1572
GARCH(-1)	-0.420621	0.140562	-2.992423	0.0028

R-squared	0.536234	Mean dependent var	0.037932
Adjusted R-squared	0.532452	S.D. dependent var	339.5203
S.E. of regression	232.1556	Akaike info criterion	13.71509
Sum squared resid	33038376	Schwarz criterion	13.75801
Log likelihood	-4238.820	Hannan-Quinn criter.	13.73178
F-statistic	141.7576	Durbin-Watson stat	2.111536
Prob(F-statistic)	0.000000		

Inverted MA Roots 1.02
Estimated MA process is noninvertible

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

14) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA with GJR(1,2,2)

Equation: UNTITLED Workfile: GOLDPRICE96.5_LAST_ชุด...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 08/31/09 Time: 00:02
Sample (adjusted): 4 621
Included observations: 618 after adjustments
Convergence achieved after 60 iterations
MA Backcast: 2 3
Presample variance: backcast (parameter = 0.7)
GARCH = C(4) + C(5)*RESID(-1)^2 + C(6)*RESID(-1)^2*(RESID(-1)<0) + C(7)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.054779	0.070224	0.780054	0.4354
AR(1)	-0.994109	0.005157	-192.7638	0.0000
MA(2)	-0.990356	0.003782	-261.8586	0.0000
Variance Equation				
C	1096.306	342.2722	3.203022	0.0014
RESID(-1)^2	0.047419	0.010295	4.606061	0.0000
RESID(-1)^2*(RESID(-1)<0)	0.000974	0.018652	0.052227	0.9583
GARCH(-1)	0.933818	0.014191	65.80463	0.0000

R-squared	0.522353	Mean dependent var	-0.235259
Adjusted R-squared	0.517662	S.D. dependent var	339.7273
S.E. of regression	235.9425	Akaike info criterion	13.67860
Sum squared resid	34013662	Schwarz criterion	13.72874
Log likelihood	-4219.688	Hannan-Quinn criter.	13.69809
F-statistic	111.3644	Durbin-Watson stat	2.105274
Prob(F-statistic)	0.000000		

Inverted AR Roots -.99
Inverted MA Roots 1.00 -1.00

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

15) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA with GJR(9,2,0)

Equation: UNTITLED Workfile: GOLDPRICE96.5_LAST_ชุด...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 08/31/09 Time: 00:03
Sample (adjusted): 12 621
Included observations: 610 after adjustments
Failure to improve Likelihood after 23 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(11) + C(12)*RESID(-1)^2 + C(13)*RESID(-1)^2*(RESID(-1)<0) + C(14)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.757554	1.832160	0.959280	0.3374
AR(1)	-0.891024	0.055267	-16.12211	0.0000
AR(2)	-0.850498	0.057932	-14.68086	0.0000
AR(3)	-0.747946	0.067927	-11.01101	0.0000
AR(4)	-0.639698	0.065538	-9.760691	0.0000
AR(5)	-0.523148	0.067981	-7.695521	0.0000
AR(6)	-0.494100	0.068250	-7.239535	0.0000
AR(7)	-0.400613	0.062319	-6.428397	0.0000
AR(8)	-0.213921	0.054119	-3.952819	0.0001
AR(9)	-0.155708	0.043777	-3.556820	0.0004
Variance Equation				
C	69545.79	10694.88	6.502719	0.0000
RESID(-1)^2	0.078700	0.029145	2.700290	0.0069
RESID(-1)^2*(RESID(-1)<0)	0.089565	0.085558	1.046832	0.2952
GARCH(-1)	-0.213407	0.148594	-1.436177	0.1510

R-squared	0.480160	Mean dependent var	-0.284525
Adjusted R-squared	0.468821	S.D. dependent var	340.5323
S.E. of regression	248.1867	Akaike info criterion	13.85469
Sum squared resid	36711603	Schwarz criterion	13.95599
Log likelihood	-4211.681	Hannan-Quinn criter.	13.89410
F-statistic	42.34670	Durbin-Watson stat	2.103893
Prob(F-statistic)	0.000000		

Inverted AR Roots	.65-.55i	.65+.55i	.17+.77i	.17-.77i
	-.19-.74i	-.19+.74i	-.66+.52i	-.66-.52i
	-.83			

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

16) การประมาณค่าพารามิเตอร์ของแบบจำลอง ARIMA with GJR(0,2,2)

Equation: UNTITLED Workfile: GOLDPRICE96.5_LAST_ชุด...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: D(GOLD,2)
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 08/31/09 Time: 00:14
Sample (adjusted): 3 621
Included observations: 619 after adjustments
Convergence achieved after 92 iterations
MA Backcast: OFF (Roots of MA process too large)
Presample variance: backcast (parameter = 0.7)
GARCH = C(4) + C(5)*RESID(-1)^2 + C(6)*RESID(-1)^2*(RESID(-1)<0) + C(7)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.021323	0.016758	1.272427	0.2032
MA(1)	-0.826710	0.049002	-16.87101	0.0000
MA(2)	-0.191807	0.051630	-3.715024	0.0002
Variance Equation				
C	74804.39	8095.896	9.239791	0.0000
RESID(-1)^2	0.075115	0.021979	3.417647	0.0006
RESID(-1)^2*(RESID(-1)<0)	0.025550	0.021876	1.167976	0.2428
GARCH(-1)	-0.346891	0.099393	-3.490088	0.0005

R-squared	0.508232	Mean dependent var	0.037932
Adjusted R-squared	0.503411	S.D. dependent var	339.5203
S.E. of regression	239.2569	Akaike info criterion	13.75713
Sum squared resid	35033251	Schwarz criterion	13.80721
Log likelihood	-4250.832	Hannan-Quinn criter.	13.77660
F-statistic	105.4148	Durbin-Watson stat	2.457869
Prob(F-statistic)	0.000000		

Inverted MA Roots	1.02	-.19
	Estimated MA process is noninvertible	

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 6

ภาคผนวก ค

การคำนวณหาค่า MAPE และ RMSE

1.) แสดงค่าพยากรณ์ราคาทองคำ ไปข้างหน้า 50 วัน โดยใช้ ARIMA(0,2,1) และค่า MAPE ของค่าพยากรณ์

ครั้งที่	ค่าจริง	ค่าพยากรณ์	APE	ครั้งที่	ค่าจริง	ค่าพยากรณ์	APE
1	15494.33	15562.98132	0.443073803	26	14907.02	15086.78689	1.205921048
2	15422.23	15491.88473	0.451651471	27	15134.43	14913.45498	1.460081529
3	15587.21	15420.79236	1.067655084	28	14982.13	15137.75394	1.038730415
4	15878.55	15583.43448	1.858579779	29	15006.81	14987.67989	0.127476197
5	15703.93	15870.61275	1.061407896	30	14896.33	15012.1093	0.777233735
6	15815.77	15698.37542	0.742262807	31	14874.7	14903.29059	0.192209523
7	15473.28	15808.57227	2.166911442	32	14635.46	14882.08628	1.685128305
8	15796.82	15470.8544	2.063488719	33	14679.48	14646.36187	0.225608325
9	15448.97	15789.79548	2.20613724	34	14690.76	14689.93305	0.005629035
10	15389.41	15446.79602	0.372892924	35	14856.35	14701.22185	1.04418751
11	15401.35	15388.06979	0.086227598	36	14921.08	14864.63396	0.378297288
12	15368.16	15399.8421	0.206154157	37	15114.33	14928.58455	1.228936067
13	15360.26	15367.1216	0.044671126	38	15084.94	15119.22276	0.227264827
14	15118.78	15359.33936	1.591129421	39	15077.29	15090.33912	0.086548171
15	14969.95	15121.28897	1.010951747	40	15246.87	15082.89456	1.075469516
16	15048.69	14974.62419	0.492174438	41	15243.65	15250.17129	0.04278038
17	15149.04	15052.33508	0.63835673	42	15279.82	15247.06422	0.214372786
18	15042.55	15151.33514	0.723182847	43	15214.13	15282.79054	0.451294555
19	15049.05	15046.40731	0.017560502	44	15261.04	15218.09408	0.281408853
20	14873.95	15052.89038	1.203045434	45	15293.47	15264.41599	0.189976583
21	14935.14	14880.34675	0.36687467	46	15041.04	15296.45476	1.69811904
22	15009.17	14940.78077	0.455649677	47	14944.56	15047.6649	0.689915947
23	15141.37	15013.8621	0.842116003	48	15026.98	14952.66657	0.494533334
24	15098.19	15144.27563	0.305239449	49	15338.19	15034.05395	1.982867897
25	15082.92	15101.76925	0.124970846	50	15357.3	15340.97439	0.106305196
						MAPE	**0.749053237**

ที่มา : การคำนวณ

2.) แสดงค่าพยากรณ์ราคาทองคำ ไปข้างหน้า 50 วัน โดยใช้ ARIMA(0,2,1) และค่า RMSE ของค่าพยากรณ์

ครั้งที่	ค่าจริง	ค่าพยากรณ์	SE	ครั้งที่	ค่าจริง	ค่าพยากรณ์	SE
1	15494.33	15562.98132	4713.003349	26	14907.02	15086.78689	32316.13541
2	15422.23	15491.88473	4851.781222	27	15134.43	14913.45498	48829.95814
3	15587.21	15420.79236	27694.8309	28	14982.13	15137.75394	24218.81104
4	15878.55	15583.43448	87093.16981	29	15006.81	14987.67989	365.9611374
5	15703.93	15870.61275	27783.14015	30	14896.33	15012.1093	13404.84678
6	15815.77	15698.37542	13781.48703	31	14874.7	14903.29059	817.421836
7	15473.28	15808.57227	112420.9096	32	14635.46	14882.08628	60824.52147
8	15796.82	15470.8544	106253.5715	33	14679.48	14646.36187	1096.810463
9	15448.97	15789.79548	116162.0081	34	14690.76	14689.93305	0.683842994
10	15389.41	15446.79602	3293.155404	35	14856.35	14701.22185	24064.74325
11	15401.35	15388.06979	176.3640899	36	14921.08	14864.63396	3186.155543
12	15368.16	15399.8421	1003.755502	37	15114.33	14928.58455	34501.37319
13	15360.26	15367.1216	47.08156982	38	15084.94	15119.22276	1175.30783
14	15118.78	15359.33936	57868.80409	39	15077.29	15090.33912	170.2794997
15	14969.95	15121.28897	22903.48418	40	15246.87	15082.89456	26887.94459
16	15048.69	14974.62419	5485.743527	41	15243.65	15250.17129	42.52724059
17	15149.04	15052.33508	9351.840857	42	15279.82	15247.06422	1072.940849
18	15042.55	15151.33514	11834.20697	43	15214.13	15282.79054	4714.269782
19	15049.05	15046.40731	6.983804069	44	15261.04	15218.09408	1844.35184
20	14873.95	15052.89038	32019.65826	45	15293.47	15264.41599	844.1355938
21	14935.14	14880.34675	3002.299763	46	15041.04	15296.45476	65236.70171
22	15009.17	14940.78077	4677.087412	47	14944.56	15047.6649	10630.62095
23	15141.37	15013.8621	16258.26452	48	15026.98	14952.66657	5522.485174
24	15098.19	15144.27563	2123.885471	49	15338.19	15034.05395	92498.73414
25	15082.92	15101.76925	355.2943284	50	15357.3	15340.97439	266.5254707
						MSE	**22513.921**
						RMSE	**150.0464**

ที่มา : การคำนวณ

3.) แสดงค่าพยากรณ์ราคาทองคำ ไปข้างหน้า 50 วัน โดยใช้แบบจำลอง ARIMA(1,2,2) และค่า MAPE ของค่าพยากรณ์

ครั้งที่	ค่าจริง	ค่าพยากรณ์	APE	ครั้งที่	ค่าจริง	ค่าพยากรณ์	APE
1	15494.33	15576.1624	0.528144136	26	14907.02	15092.42927	1.243771503
2	15422.23	15506.26479	0.544893895	27	15134.43	14912.72778	1.464886492
3	15587.21	15431.26334	1.000478368	28	14982.13	15143.84536	1.079388292
4	15878.55	15599.31284	1.758580966	29	15006.81	14988.35934	0.122948552
5	15703.93	15889.44079	1.181301668	30	14896.33	15015.48381	0.799886989
6	15815.77	15716.73369	0.626187117	31	14874.7	14902.22018	0.185013314
7	15473.28	15826.12417	2.280344991	32	14635.46	14882.6729	1.689136489
8	15796.82	15485.24559	1.972386934	33	14679.48	14640.29544	0.266934253
9	15448.97	15806.60284	2.31493002	34	14690.76	14686.36217	0.029936017
10	15389.41	15461.14374	0.466124027	35	14856.35	14695.82566	1.080509949
11	15401.35	15397.15119	0.027262607	36	14921.08	14863.86407	0.383457019
12	15368.16	15413.17377	0.292902807	37	15114.33	14927.18418	1.238201205
13	15360.26	15375.77724	0.101022001	38	15084.94	15122.84242	0.251260005
14	15118.78	15371.7938	1.673506695	39	15077.29	15091.85609	0.096609501
15	14969.95	15125.38756	1.03833051	40	15246.87	15085.56149	1.057977874
16	15048.69	14979.6214	0.458967508	41	15243.65	15254.33807	0.07011493
17	15149.04	15054.80244	0.622069536	42	15279.82	15252.69489	0.177522448
18	15042.55	15159.40963	0.776860519	43	15214.13	15287.35293	0.481282429
19	15049.05	15048.71797	0.002206345	44	15261.04	15223.03783	0.249014295
20	14873.95	15058.83015	1.242979502	45	15293.47	15268.36529	0.164153131
21	14935.14	14879.44405	0.372918861	46	15041.04	15302.66671	1.739418987
22	15009.17	14944.19937	0.4328729	47	14944.56	15047.51854	0.688936595
23	15141.37	15015.21165	0.833203021	48	15026.98	14952.058	0.498583227
24	15098.19	15151.22984	0.351299323	49	15338.19	15033.24038	1.988172127
25	15082.92	15104.68653	0.144312425	50	15357.3	15347.22101	0.065629956
						MAPE	**0.76313665**

ที่มา : การคำนวณ

4.) แสดงค่าพยากรณ์ราคาทองคำ ไปข้างหน้า 50 วัน โดยใช้แบบจำลอง ARIMA(1,2,2) และค่า RMSE ของค่าพยากรณ์

ครั้งที่	ค่าจริง	ค่าพยากรณ์	SE	ครั้งที่	ค่าจริง	ค่าพยากรณ์	SE
1	15494.33	15576.1624	6696.540932	26	14907.02	15092.42927	34376.59617
2	15422.23	15506.26479	7061.845895	27	15134.43	14912.72778	49151.87469
3	15587.21	15431.26334	24319.3621	28	14982.13	15143.84536	26151.8567
4	15878.55	15599.31284	77973.39043	29	15006.81	14988.35934	340.4266923
5	15703.93	15889.44079	34414.2521	30	14896.33	15015.48381	14197.62936
6	15815.77	15716.73369	9808.19154	31	14874.7	14902.22018	757.3600579
7	15473.28	15826.12417	124499.0051	32	14635.46	14882.6729	61114.21553
8	15796.82	15485.24559	97078.61527	33	14679.48	14640.29544	1535.42977
9	15448.97	15806.60284	127901.2513	34	14690.76	14686.36217	19.34089526
10	15389.41	15461.14374	5145.729117	35	14856.35	14695.82566	25768.06368
11	15401.35	15397.15119	17.63000155	36	14921.08	14863.86407	3273.662482
12	15368.16	15413.17377	2026.239673	37	15114.33	14927.18418	35023.5565
13	15360.26	15375.77724	240.7848	38	15084.94	15122.84242	1436.593515
14	15118.78	15371.7938	64015.98068	39	15077.29	15091.85609	212.1711129
15	14969.95	15125.38756	24160.8345	40	15246.87	15085.56149	26020.43574
16	15048.69	14979.6214	4770.471158	41	15243.65	15254.33807	114.2349362
17	15149.04	15054.80244	8880.71824	42	15279.82	15252.69489	735.7716203
18	15042.55	15159.40963	13656.17359	43	15214.13	15287.35293	5361.59813
19	15049.05	15048.71797	0.110246557	44	15261.04	15223.03783	1444.165017
20	14873.95	15058.83015	34180.6697	45	15293.47	15268.36529	630.2464561
21	14935.14	14879.44405	3102.039281	46	15041.04	15302.66671	68448.53309
22	15009.17	14944.19937	4221.182693	47	14944.56	15047.51854	10600.46155
23	15141.37	15015.21165	15915.92986	48	15026.98	14952.058	5613.306359
24	15098.19	15151.22984	2813.22455	49	15338.19	15033.24038	92994.26975
25	15082.92	15104.68653	473.7817233	50	15357.3	15347.22101	101.5860241
						MSE	**23175.94681**
						RMSE	**152.2364832**

ที่มา : การคำนวณ

5.) แสดงค่าพยากรณ์ราคาทองคำ ไปข้างหน้า 50 วัน โดยใช้แบบจำลอง ARIMA(9,2,0) with GARCH-M(1,1) และค่า MAPE ของค่าพยากรณ์

ครั้งที่	ค่าจริง	ค่าพยากรณ์	APE	ครั้งที่	ค่าจริง	ค่าพยากรณ์	APE
1	15494.33	15651.76622	1.016089227	26	14907.02	15109.52711	1.358468067
2	15422.23	15570.50028	0.961406212	27	15134.43	14918.03154	1.429842154
3	15587.21	15448.77206	0.888150837	28	14982.13	15103.77392	0.811926742
4	15878.55	15610.23918	1.689769008	29	15006.81	14972.45602	0.228922581
5	15703.93	15920.60225	1.379732635	30	14896.33	15001.03861	0.702915498
6	15815.77	15802.69428	0.082675179	31	14874.7	14926.01644	0.344991425
7	15473.28	15909.55296	2.819524778	32	14635.46	14898.5948	1.797926377
8	15796.82	15560.2499	1.497580511	33	14679.48	14609.35326	0.477719527
9	15448.97	15809.36625	2.332817364	34	14690.76	14628.27941	0.425305352
10	15389.41	15435.17678	0.29739137	35	14856.35	14659.5317	1.324809237
11	15401.35	15397.2399	0.026686606	36	14921.08	14808.67074	0.753358714
12	15368.16	15416.21758	0.312708726	37	15114.33	14908.56897	1.361363905
13	15360.26	15397.41274	0.241875706	38	15084.94	15093.90384	0.059422456
14	15118.78	15323.53761	1.354326302	39	15077.29	15091.30427	0.09294956
15	14969.95	15049.96647	0.534513976	40	15246.87	15068.08191	1.172621565
16	15048.69	14948.08255	0.668546225	41	15243.65	15260.09231	0.107863337
17	15149.04	14947.99447	1.327117303	42	15279.82	15271.19109	0.056472576
18	15042.55	15098.79558	0.373909878	43	15214.13	15340.64329	0.831551234
19	15049.05	14944.87437	0.692240566	44	15261.04	15287.26584	0.171848341
20	14873.95	15017.18623	0.963000642	45	15293.47	15350.32337	0.371749305
21	14935.14	14859.3163	0.5076866	46	15041.04	15333.41937	1.943877359
22	15009.17	14871.40906	0.917845127	47	14944.56	15077.87824	0.892085445
23	15141.37	14935.44202	1.360035294	48	15026.98	14955.29809	0.47702138
24	15098.19	15097.43676	0.004988954	49	15338.19	15035.9913	1.970237044
25	15082.92	15094.96329	0.079847222	50	15357.3	15339.45319	0.116210578
						MAPE	**0.83223852**

ที่มา : การคำนวณ

6.) แสดงค่าพยากรณ์ราคาทองคำ ไปข้างหน้า 50 วัน โดยใช้แบบจำลอง ARIMA(9,2,0) with GARCH-M(1,1) และค่า RMSE ของค่าพยากรณ์

ครั้งที่	ค่าจริง	ค่าพยากรณ์	SE	ครั้งที่	ค่าจริง	ค่าพยากรณ์	SE
1	15494.33	15651.76622	24786.16272	26	14907.02	15109.52711	41009.12817
2	15422.23	15570.50028	21984.07513	27	15134.43	14918.03154	46828.29345
3	15587.21	15448.77206	19165.06213	28	14982.13	15103.77392	14797.24329
4	15878.55	15610.23918	71990.69438	29	15006.81	14972.45602	1180.195725
5	15703.93	15920.60225	46946.86272	30	14896.33	15001.03861	10963.89347
6	15815.77	15802.69428	170.9743546	31	14874.7	14926.01644	2633.376967
7	15473.28	15909.55296	190334.0987	32	14635.46	14898.5948	69239.92073
8	15796.82	15560.2499	55965.41111	33	14679.48	14609.35326	4917.759996
9	15448.97	15809.36625	129885.4605	34	14690.76	14628.27941	3903.823938
10	15389.41	15435.17678	2094.597898	35	14856.35	14659.5317	38737.44205
11	15401.35	15397.2399	16.89290255	36	14921.08	14808.67074	12635.84092
12	15368.16	15416.21758	2309.530741	37	15114.33	14908.56897	42337.60275
13	15360.26	15397.41274	1380.325893	38	15084.94	15093.90384	80.3504614
14	15118.78	15323.53761	41925.68051	39	15077.29	15091.30427	196.3998967
15	14969.95	15049.96647	6402.636257	40	15246.87	15068.08191	31965.17954
16	15048.69	14948.08255	10121.85877	41	15243.65	15260.09231	270.3495463
17	15149.04	14947.99447	40419.30558	42	15279.82	15271.19109	74.45805392
18	15042.55	15098.79558	3163.565303	43	15214.13	15340.64329	16005.61148
19	15049.05	14944.87437	10852.56166	44	15261.04	15287.26584	687.7948971
20	14873.95	15017.18623	20516.61874	45	15293.47	15350.32337	3232.305497
21	14935.14	14859.3163	5749.234169	46	15041.04	15333.41937	85485.69669
22	15009.17	14871.40906	18978.07534	47	14944.56	15077.87824	17773.75435
23	15141.37	14935.44202	42406.33131	48	15026.98	14955.29809	5138.295835
24	15098.19	15097.43676	0.567373028	49	15338.19	15035.9913	91324.05508
25	15082.92	15094.96329	145.0408986	50	15357.3	15339.45319	318.5085262
						MSE	**26188.97813**
						RMSE	**161.8300903**

ที่มา : การคำนวณ

7.) แสดงค่าพยากรณ์ราคาทองคำ ไปข้างหน้า 50 วัน โดยใช้แบบจำลอง ARIMA(0,2,1) with E-GARCH(1,1) และค่า MAPE ของค่าพยากรณ์

ครั้งที่	ค่าจริง	ค่าพยากรณ์	APE	ครั้งที่	ค่าจริง	ค่าพยากรณ์	APE
1	15494.33	15560.34547	0.426062104	26	14907.02	15084.20027	1.188569336
2	15422.23	15489.36547	0.435316203	27	15134.43	14911.24159	1.474706437
3	15587.21	15418.39391	1.08304235	28	14982.13	15134.99726	1.020330633
4	15878.55	15580.61532	1.87633433	29	15006.81	14985.23805	0.143747743
5	15703.93	15867.06963	1.038845857	30	14896.33	15009.58514	0.760288867
6	15815.77	15695.15964	0.762595563	31	14874.7	14900.99336	0.176765642
7	15473.28	15805.03518	2.144052056	32	14635.46	14879.81898	1.66963647
8	15796.82	15468.03295	2.081349593	33	14679.48	14644.62699	0.237426717
9	15448.97	15786.179	2.182728056	34	14690.76	14688.09529	0.018138675
10	15389.41	15443.90662	0.35411768	35	14856.35	14699.35386	1.056761206
11	15401.35	15385.26686	0.104426828	36	14921.08	14862.37998	0.393403305
12	15368.16	15396.96437	0.187428881	37	15114.33	14926.16542	1.244941572
13	15360.26	15364.27136	0.026115152	38	15084.94	15116.33808	0.208141879
14	15118.78	15356.4599	1.572083871	39	15077.29	15087.48779	0.067636764
15	14969.95	15118.91789	0.995112785	40	15246.87	15080.02825	1.094268839
16	15048.69	14972.56444	0.505861735	41	15243.65	15246.88218	0.021203442
17	15149.04	15050.07281	0.653290156	42	15279.82	15243.73789	0.236142251
18	15042.55	15148.8149	0.706428758	43	15214.13	15279.33594	0.428588024
19	15049.05	15044.09796	0.032905978	44	15261.04	15214.7426	0.303369883
20	14873.95	15050.53885	1.18723572	45	15293.47	15260.91236	0.21288586
21	14935.14	14878.37042	0.380107435	46	15041.04	15292.82848	1.674009755
22	15009.17	14938.64767	0.469861633	47	14944.56	15044.56888	0.669199259
23	15141.37	15011.53835	0.857463009	48	15026.98	14949.75889	0.513883113
24	15098.19	15141.62198	0.287663492	49	15338.19	15030.92922	2.003240169
25	15082.92	15099.17994	0.107803659	50	15357.3	15337.09989	0.131534253
						MAPE	**0.74814106**

ที่มา : การคำนวณ

8.) แสดงค่าพยากรณ์ราคาทองคำ ไปข้างหน้า 50 วัน โดยใช้แบบจำลอง ARIMA(0,2,1) with E-GARCH(1,1) และค่า RMSE ของค่าพยากรณ์

ครั้งที่	ค่าจริง	ค่าพยากรณ์	SE	ครั้งที่	ค่าจริง	ค่าพยากรณ์	SE
1	15494.33	15560.34547	4358.042066	26	14907.02	15084.20027	31392.84757
2	15422.23	15489.36547	4507.170806	27	15134.43	14911.24159	49813.06787
3	15587.21	15418.39391	28498.87071	28	14982.13	15134.99726	23368.39974
4	15878.55	15580.61532	88765.07635	29	15006.81	14985.23805	465.3490575
5	15703.93	15867.06963	26614.53763	30	14896.33	15009.58514	12826.72642
6	15815.77	15695.15964	14546.85899	31	14874.7	14900.99336	691.340726
7	15473.28	15805.03518	110061.4981	32	14635.46	14879.81898	59711.30998
8	15796.82	15468.03295	108100.9235	33	14679.48	14644.62699	1214.732123
9	15448.97	15786.179	113709.9114	34	14690.76	14688.09529	7.100674995
10	15389.41	15443.90662	2969.881774	35	14856.35	14699.35386	24647.78905
11	15401.35	15385.26686	258.6674315	36	14921.08	14862.37998	3445.692567
12	15368.16	15396.96437	829.6917485	37	15114.33	14926.16542	35405.90825
13	15360.26	15364.27136	16.09097081	38	15084.94	15116.33808	985.8392793
14	15118.78	15356.4599	56491.73579	39	15077.29	15087.48779	103.9949434
15	14969.95	15118.91789	22191.43115	40	15246.87	15080.02825	27836.16865
16	15048.69	14972.56444	5795.101534	41	15243.65	15246.88218	10.44697808
17	15149.04	15050.07281	9794.504101	42	15279.82	15243.73789	1301.918724
18	15042.55	15148.8149	11292.22879	43	15214.13	15279.33594	4251.814505
19	15049.05	15044.09796	24.5226718	44	15261.04	15214.7426	2143.449177
20	14873.95	15050.53885	31183.621	45	15293.47	15260.91236	1059.999602
21	14935.14	14878.37042	3222.784945	46	15041.04	15292.82848	63397.4371
22	15009.17	14938.64767	4973.399217	47	14944.56	15044.56888	10001.77705
23	15141.37	15011.53835	16856.25652	48	15026.98	14949.75889	5963.100223
24	15098.19	15141.62198	1886.336936	49	15338.19	15030.92922	94409.18893
25	15082.92	15099.17994	264.3856364	50	15357.3	15337.09989	408.0444355
						MSE	**22441.53947**
						RMSE	**149.8050048**

ที่มา : การคำนวณ

9.) แสดงค่าพยากรณ์ราคาทองคำ ไปข้างหน้า 50 วัน โดยใช้แบบจำลอง ARIMA(1,2,2) with E-GARCH(1,1) และค่า MAPE ของค่าพยากรณ์

ครั้งที่	ค่าจริง	ค่าพยากรณ์	APE	ครั้งที่	ค่าจริง	ค่าพยากรณ์	APE
1	15494.33	15599.60968	0.679472282	26	14907.02	15084.71358	1.192012727
2	15422.23	15498.57819	0.495052847	27	15134.43	14938.04076	1.297632217
3	15587.21	15454.88199	0.848952509	28	14982.13	15137.39426	1.036329699
4	15878.55	15592.32152	1.802610963	29	15006.81	15012.30043	0.036586224
5	15703.93	15912.64398	1.32905569	30	14896.33	15009.88523	0.762303428
6	15815.77	15708.23844	0.679900906	31	14874.7	14925.80936	0.34359924
7	15473.28	15850.25116	2.436271819	32	14635.46	14877.65655	1.65486119
8	15796.82	15475.85461	2.03183547	33	14679.48	14663.56376	0.108425089
9	15448.97	15832.74062	2.484117839	34	14690.76	14682.62119	0.055400853
10	15389.41	15449.85946	0.39279906	35	14856.35	14718.82735	0.925682633
11	15401.35	15424.75598	0.151973576	36	14921.08	14860.39028	0.406738088
12	15368.16	15402.32468	0.222308206	37	15114.33	14949.42933	1.09102206
13	15360.26	15403.18654	0.279464954	38	15084.94	15119.42605	0.228612426
14	15118.78	15361.22398	1.603594898	39	15077.29	15113.08606	0.23741708
15	14969.95	15152.3928	1.21872684	40	15246.87	15082.35499	1.079008387
16	15048.69	14970.09997	0.522238344	41	15243.65	15275.79128	0.210850258
17	15149.04	15082.52765	0.439053259	42	15279.82	15248.77036	0.203206863
18	15042.55	15149.7857	0.712882465	43	15214.13	15308.81558	0.622352902
19	15049.05	15075.72109	0.17722772	44	15261.04	15218.93628	0.275890248
20	14873.95	15049.83838	1.182526392	45	15293.47	15290.14586	0.02173566
21	14935.14	14906.06951	0.194644917	46	15041.04	15298.48072	1.711588558
22	15009.17	14936.23523	0.485934756	47	14944.56	15068.72046	0.830807092
23	15141.37	15041.56457	0.659157208	48	15026.98	14949.00468	0.518902143
24	15098.19	15143.22086	0.298253371	49	15338.19	15054.95408	1.846605905
25	15082.92	15130.26736	0.313913727	50	15357.3	15344.31098	0.084578794
						MAPE	**0.768482396**

ที่มา : การคำนวณ

10.)แสดงค่าพยากรณ์ราคาทองคำ ไปข้างหน้า 50 วัน โดยใช้แบบจำลอง ARIMA(1,2,2) with E-GARCH(1,1) และค่า RMSE ของค่าพยากรณ์

ครั้งที่	ค่าจริง	ค่าพยากรณ์	SE	ครั้งที่	ค่าจริง	ค่าพยากรณ์	SE
1	15494.33	15599.60968	11083.81053	26	14907.02	15084.71358	31575.00682
2	15422.23	15498.57819	5829.04592	27	15134.43	14938.04076	38568.73343
3	15587.21	15454.88199	17510.70232	28	14982.13	15137.39426	24106.9913
4	15878.55	15592.32152	81926.7445	29	15006.81	15012.30043	30.14476747
5	15703.93	15912.64398	43561.52343	30	14896.33	15009.88523	12894.79122
6	15815.77	15708.23844	11563.03715	31	14874.7	14925.80936	2612.16629
7	15473.28	15850.25116	142107.2555	32	14635.46	14877.65655	58659.16765
8	15796.82	15475.85461	103018.7828	33	14679.48	14663.56376	253.3266714
9	15448.97	15832.74062	147279.8885	34	14690.76	14682.62119	66.24016993
10	15389.41	15449.85946	3654.136948	35	14856.35	14718.82735	18912.47977
11	15401.35	15424.75598	547.8400118	36	14921.08	14860.39028	3683.241571
12	15368.16	15402.32468	1167.225412	37	15114.33	14949.42933	27192.23247
13	15360.26	15403.18654	1842.688144	38	15084.94	15119.42605	1189.287456
14	15118.78	15361.22398	58779.08569	39	15077.29	15113.08606	1281.358033
15	14969.95	15152.3928	33285.37476	40	15246.87	15082.35499	27065.18721
16	15048.69	14970.09997	6176.39272	41	15243.65	15275.79128	1033.061584
17	15149.04	15082.52765	4423.893213	42	15279.82	15248.77036	964.0803263
18	15042.55	15149.7857	11499.49561	43	15214.13	15308.81558	8965.35898
19	15049.05	15075.72109	711.3469478	44	15261.04	15218.93628	1772.723329
20	14873.95	15049.83838	30936.72374	45	15293.47	15290.14586	11.04988432
21	14935.14	14906.06951	845.0934426	46	15041.04	15298.48072	66275.7241
22	15009.17	14936.23523	5319.481204	47	14944.56	15068.72046	15415.82089
23	15141.37	15041.56457	9961.124207	48	15026.98	14949.00468	6080.150723
24	15098.19	15143.22086	2027.778407	49	15338.19	15054.95408	80222.5877
25	15082.92	15130.26736	2241.772152	50	15357.3	15344.31098	168.7146166
						MSE	**23325.99741**
						RMSE	**152.7285088**

ที่มา : การคำนวณ

11.) แสดงค่าพยากรณ์ราคาทองคำ ไปข้างหน้า 50 วัน โดยใช้แบบจำลอง ARIMA(0,2,1) with GJR(1,1) และค่า MAPE ของค่าพยากรณ์

ครั้งที่	ค่าจริง	ค่าพยากรณ์	APE	ครั้งที่	ค่าจริง	ค่าพยากรณ์	APE
1	15494.33	15558.62768	0.414975513	26	14907.02	15080.42297	1.163230304
2	15422.23	15487.44179	0.422842809	27	15134.43	14906.92651	1.503218087
3	15587.21	15416.25847	1.096742341	28	14982.13	15131.23044	0.995188506
4	15878.55	15578.90958	1.887076716	29	15006.81	14980.99999	0.17198868
5	15703.93	15866.15214	1.033003428	30	14896.33	15005.34576	0.731829658
6	15815.77	15693.78202	0.771306013	31	14874.7	14896.38443	0.145780631
7	15473.28	15803.96603	2.137142399	32	14635.46	14875.07292	1.63720797
8	15796.82	15466.04109	2.093958864	33	14679.48	14639.14637	0.27476198
9	15448.97	15785.05571	2.175457068	34	14690.76	14682.63255	0.055323557
10	15389.41	15441.84498	0.340721164	35	14856.35	14693.82133	1.094001327
11	15401.35	15383.02606	0.118976166	36	14921.08	14857.1982	0.428131206
12	15368.16	15394.73472	0.172920636	37	15114.33	14921.07076	1.278649074
13	15360.26	15361.93041	0.010874899	38	15084.94	15111.6853	0.177298014
14	15118.78	15354.07385	1.556301821	39	15077.29	15082.68334	0.035771256
15	14969.95	15115.84794	0.974605423	40	15246.87	15075.12794	1.126408663
16	15048.69	14969.04348	0.529258807	41	15243.65	15242.36818	0.008408858
17	15149.04	15046.70939	0.67549238	42	15279.82	15239.15105	0.266161207
18	15042.55	15145.67355	0.685545673	43	15214.13	15274.78262	0.398659781
19	15049.05	15040.62125	0.05600855	44	15261.04	15209.94664	0.334796064
20	14873.95	15047.02589	1.163617528	45	15293.47	15256.17495	0.24386259
21	14935.14	14874.32493	0.407194502	46	15041.04	15288.11289	1.642658258
22	15009.17	14934.69964	0.496165771	47	14944.56	15039.09886	0.632597144
23	15141.37	15007.72668	0.882636924	48	15026.98	14943.93858	0.552615522
24	15098.19	15138.11051	0.264405945	49	15338.19	15025.23783	2.040346178
25	15082.92	15095.49961	0.083403044	50	15357.3	15332.16744	0.163652206
						MAPE	**0.751063622**

ที่มา : การคำนวณ

12.)แสดงค่าพยากรณ์ราคาทองคำ ไปข้างหน้า 50 วัน โดยใช้แบบจำลอง ARIMA(0,2,1) with GJR(1,1) และค่า RMSE ของค่าพยากรณ์

ครั้งที่	ค่าจริง	ค่าพยากรณ์	SE	ครั้งที่	ค่าจริง	ค่าพยากรณ์	SE
1	15494.33	15558.62768	4134.191067	26	14907.02	15080.42297	30068.59143
2	15422.23	15487.44179	4252.577622	27	15134.43	14906.92651	51757.83754
3	15587.21	15416.25847	29224.42624	28	14982.13	15131.23044	22230.93993
4	15878.55	15578.90958	89784.38124	29	15006.81	14980.99999	666.1568483
5	15703.93	15866.15214	26316.02117	30	14896.33	15005.34576	11884.43611
6	15815.77	15693.78202	14881.06847	31	14874.7	14896.38443	470.2145683
7	15473.28	15803.96603	109353.2488	32	14635.46	14875.07292	57414.35027
8	15796.82	15466.04109	109414.689	33	14679.48	14639.14637	1626.801699
9	15448.97	15785.05571	112953.6043	34	14690.76	14682.63255	66.05545904
10	15389.41	15441.84498	2749.426809	35	14856.35	14693.82133	26415.56733
11	15401.35	15383.02606	335.7666188	36	14921.08	14857.1982	4080.88434
12	15368.16	15394.73472	706.2157417	37	15114.33	14921.07076	37349.1341
13	15360.26	15361.93041	2.790278772	38	15084.94	15111.6853	715.3110169
14	15118.78	15354.07385	55363.19513	39	15077.29	15082.68334	29.08807319
15	14969.95	15115.84794	21286.21022	40	15246.87	15075.12794	29495.33674
16	15048.69	14969.04348	6343.567695	41	15243.65	15242.36818	1.643054431
17	15149.04	15046.70939	10471.5539	42	15279.82	15239.15105	1653.963762
18	15042.55	15145.67355	10634.46671	43	15214.13	15274.78262	3678.739988
19	15049.05	15040.62125	71.04390489	44	15261.04	15209.94664	2610.531561
20	14873.95	15047.02589	29955.26348	45	15293.47	15256.17495	1390.920908
21	14935.14	14874.32493	3698.472608	46	15041.04	15288.11289	61045.01085
22	15009.17	14934.69964	5545.835128	47	14944.56	15039.09886	8937.596
23	15141.37	15007.72668	17860.53763	48	15026.98	14943.93858	6895.878104
24	15098.19	15138.11051	1593.647278	49	15338.19	15025.23783	97939.06288
25	15082.92	15095.49961	158.2467004	50	15357.3	15332.16744	631.6455838
						MSE	**22522.92292**
						RMSE	**150.0763903**

ที่มา : การคำนวณ

13.)แสดงค่าพยากรณ์ราคาทองคำ ไปข้างหน้า 50 วัน โดยใช้แบบจำลอง ARIMA(1,2,2) with GJR(1,1) และค่า MAPE ของค่าพยากรณ์

ครั้งที่	ค่าจริง	ค่าพยากรณ์	APE	ครั้งที่	ค่าจริง	ค่าพยากรณ์	APE
1	15494.33	15586.07136	0.592096328	26	14907.02	15099.07923	1.288381139
2	15422.23	15512.11475	0.582825881	27	15134.43	14923.5926	1.393097756
3	15587.21	15441.35191	0.935754965	28	14982.13	15150.55538	1.12417516
4	15878.55	15605.14958	1.721822304	29	15006.81	14999.05113	0.051702317
5	15703.93	15899.03569	1.242400415	30	14896.33	15022.41243	0.846399257
6	15815.77	15722.37771	0.590501073	31	14874.7	14912.98122	0.257357949
7	15473.28	15835.87082	2.343335225	32	14635.46	14889.8031	1.737855207
8	15796.82	15491.10595	1.935288534	33	14679.48	14651.3101	0.19189986
9	15448.97	15816.5303	2.379189697	34	14690.76	14693.80648	0.020737415
10	15389.41	15466.93031	0.503725004	35	14856.35	14706.76247	1.00689289
11	15401.35	15407.62656	0.04075331	36	14921.08	14871.15759	0.334576352
12	15368.16	15419.0755	0.331305101	37	15114.33	14937.82604	1.167792173
13	15360.26	15386.27127	0.169341349	38	15084.94	15129.88776	0.297964433
14	15118.78	15377.79152	1.713177415	39	15077.29	15102.25817	0.16560116
15	14969.95	15136.12413	1.110051314	40	15246.87	15092.68227	1.011274658
16	15048.69	14986.13425	0.415688995	41	15243.65	15264.59266	0.137386096
17	15149.04	15065.66917	0.55033741	42	15279.82	15259.61156	0.132255742
18	15042.55	15165.75287	0.819029154	43	15214.13	15297.58229	0.548518313
19	15049.05	15059.54446	0.069735006	44	15261.04	15229.9965	0.20341666
20	14873.95	15065.3506	1.286817561	45	15293.47	15278.6457	0.096932195
21	14935.14	14890.42494	0.299394952	46	15041.04	15309.55921	1.785243663
22	15009.17	14950.9374	0.387980131	47	14944.56	15057.99695	0.759051775
23	15141.37	15026.03344	0.761731313	48	15026.98	14959.42001	0.449591237
24	15098.19	15157.77176	0.394628514	49	15338.19	15043.77466	1.919492056
25	15082.92	15115.36444	0.215107162	50	15357.3	15354.19844	0.020195991
						MAPE	**0.766796191**

ที่มา : การคำนวณ

14.)แสดงค่าพยากรณ์ราคาทองคำ ไปข้างหน้า 50 วัน โดยใช้แบบจำลอง ARIMA(1,2,2) with GJR(1,1) และค่า RMSE ของค่าพยากรณ์

ครั้งที่	ค่าจริง	ค่าพยากรณ์	SE	ครั้งที่	ค่าจริง	ค่าพยากรณ์	SE
1	15494.33	15586.07136	8416.476961	26	14907.02	15099.07923	36886.74942
2	15422.23	15512.11475	8079.26789	27	15134.43	14923.5926	44452.41123
3	15587.21	15441.35191	21274.58285	28	14982.13	15150.55538	28367.10995
4	15878.55	15605.14958	74747.78713	29	15006.81	14999.05113	60.20003945
5	15703.93	15899.03569	38066.23086	30	14896.33	15022.41243	15896.77827
6	15815.77	15722.37771	8722.120108	31	14874.7	14912.98122	1465.452024
7	15473.28	15835.87082	131472.1032	32	14635.46	14889.8031	64690.4144
8	15796.82	15491.10595	93461.07808	33	14679.48	14651.3101	793.5433538
9	15448.97	15816.5303	135100.576	34	14690.76	14693.80648	9.281063806
10	15389.41	15466.93031	6009.397863	35	14856.35	14706.76247	22376.42968
11	15401.35	15407.62656	39.39520435	36	14921.08	14871.15759	2492.246533
12	15368.16	15419.0755	2592.387942	37	15114.33	14937.82604	31153.64886
13	15360.26	15386.27127	676.5862463	38	15084.94	15129.88776	2020.300764
14	15118.78	15377.79152	67086.96975	39	15077.29	15102.25817	623.4093714
15	14969.95	15136.12413	27613.84038	40	15246.87	15092.68227	23773.85682
16	15048.69	14986.13425	3913.221642	41	15243.65	15264.59266	438.5948263
17	15149.04	15065.66917	6950.696018	42	15279.82	15259.61156	408.3810195
18	15042.55	15165.75287	15178.94717	43	15214.13	15297.58229	6964.284586
19	15049.05	15059.54446	110.1336047	44	15261.04	15229.9965	963.6987585
20	14873.95	15065.3506	36634.18994	45	15293.47	15278.6457	219.7597576
21	14935.14	14890.42494	1999.436162	46	15041.04	15309.55921	72102.56803
22	15009.17	14950.9374	3391.035408	47	14944.56	15057.99695	12867.94114
23	15141.37	15026.03344	13302.52127	48	15026.98	14959.42001	4564.351602
24	15098.19	15157.77176	3549.986461	49	15338.19	15043.77466	86680.3916
25	15082.92	15115.36444	1052.641763	50	15357.3	15354.19844	9.61966732
						MSE	**23394.46065**
						RMSE	**152.9524784**

ที่มา : การคำนวณ

ประวัติผู้เขียน

ชื่อ นายดนัยรัตน์ คณารักษ์

วัน เดือน ปี เกิด 13 กันยายน 2520

ประวัติการศึกษา สำเร็จการศึกษามัธยมตอนปลาย โรงเรียนสามัคคีวิทยาคม ปีการศึกษา 2538
สำเร็จการศึกษาปริญญาตรี บริหารธุรกิจบัณฑิต คณะบริหารธุรกิจ มหาวิทยาลัยเชียงใหม่ ปีการศึกษา 2543