ภาคผนวก

## ภาคผนวก ก

## ผลการทดสอบ Unit Root Test ของอัตราผลตอบแทน โดยการทดสอบ ADF

**1) ผลการทดสอบ Unit Root Test ของผลตอบแทนหุ้นกลุ่มพลังงาน**

**1.1) Level without intercept and trend**

Null Hypothesis: EN has a unit root
Exogenous: None
Lag Length: 1 (Automatic based on SIC, MAXLAG=22)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -23.31231 | 0.0000 |
| Test critical values: | 1% level | -2.566764 |  |
|  | 5% level | -1.941070 |  |
|  | 10% level | -1.616533 |  |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EN)
Method: Least Squares
Date: 05/30/09   Time: 11:51
Sample (adjusted): 1/07/2004 3/31/2009
Included observations: 1284 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| EN(-1) | -0.913499 | 0.039185 | -23.31231 | 0.0000 |
| D(EN(-1)) | -0.082083 | 0.027803 | -2.952345 | 0.0032 |
| R-squared | 0.502323 | Mean dependent var | | 4.48E-05 |
| Adjusted R-squared | 0.501935 | S.D. dependent var | | 0.028061 |
| S.E. of regression | 0.019804 | Akaike info criterion | | -5.004338 |
| Sum squared resid | 0.502784 | Schwarz criterion | | -4.996304 |
| Log likelihood | 3214.785 | Durbin-Watson stat | | 1.997980 |

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**1.2) Level with intercept**

Null Hypothesis: EN has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=22)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -23.30361 | 0.0000 |
| Test critical values: | 1% level | -3.435231 | |
| | 5% level | -2.863583 | |
| | 10% level | -2.567907 | |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EN)
Method: Least Squares
Date: 05/30/09   Time: 11:54
Sample (adjusted): 1/07/2004 3/31/2009
Included observations: 1284 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| EN(-1) | -0.913534 | 0.039201 | -23.30361 | 0.0000 |
| D(EN(-1)) | -0.082068 | 0.027814 | -2.950642 | 0.0032 |
| C | -6.73E-05 | 0.000553 | -0.121698 | 0.9032 |

| | | | |
|---|---|---|---|
| R-squared | 0.502328 | Mean dependent var | 4.48E-05 |
| Adjusted R-squared | 0.501551 | S.D. dependent var | 0.028061 |
| S.E. of regression | 0.019811 | Akaike info criterion | -5.002792 |
| Sum squared resid | 0.502778 | Schwarz criterion | -4.990741 |
| Log likelihood | 3214.793 | F-statistic | 646.4935 |
| Durbin-Watson stat | 1.997964 | Prob(F-statistic) | 0.000000 |

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**1.3) Level with intercept and trend**

Null Hypothesis: EN has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=22)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -23.34277 | 0.0000 |
| Test critical values: | 1% level | -3.965209 |  |
|  | 5% level | -3.413315 |  |
|  | 10% level | -3.128686 |  |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EN)
Method: Least Squares
Date: 05/30/09   Time: 11:55
Sample (adjusted): 1/07/2004 3/31/2009
Included observations: 1284 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| EN(-1) | -0.915864 | 0.039235 | -23.34277 | 0.0000 |
| D(EN(-1)) | -0.080949 | 0.027821 | -2.909616 | 0.0037 |
| C | 0.001148 | 0.001108 | 1.035795 | 0.3005 |
| @TREND(1/05/2004) | -1.89E-06 | 1.49E-06 | -1.265130 | 0.2061 |

| | | | |
|---|---|---|---|
| R-squared | 0.502950 | Mean dependent var | 4.48E-05 |
| Adjusted R-squared | 0.501785 | S.D. dependent var | 0.028061 |
| S.E. of regression | 0.019807 | Akaike info criterion | -5.002484 |
| Sum squared resid | 0.502150 | Schwarz criterion | -4.986417 |
| Log likelihood | 3215.595 | F-statistic | 431.7312 |
| Durbin-Watson stat | 1.998130 | Prob(F-statistic) | 0.000000 |

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**2) ผลการทดสอบ Unit Root Test ของผลตอบแทนหุ้นกลุ่มขนส่ง**

**2.1) Level without intercept and trend**

Null Hypothesis: TR has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=22)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -33.40560 | 0.0000 |
| Test critical values: | 1% level | -2.566763 | |
| | 5% level | -1.941070 | |
| | 10% level | -1.616534 | |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TR)
Method: Least Squares
Date: 05/30/09   Time: 11:59
Sample (adjusted): 1/06/2004 3/31/2009
Included observations: 1285 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TR(-1) | -0.931044 | 0.027871 | -33.40560 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.464985 | Mean dependent var | 2.29E-05 |
| Adjusted R-squared | 0.464985 | S.D. dependent var | 0.024183 |
| S.E. of regression | 0.017689 | Akaike info criterion | -5.231002 |
| Sum squared resid | 0.401751 | Schwarz criterion | -5.226988 |
| Log likelihood | 3361.919 | Durbin-Watson stat | 2.006482 |

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**2.2) Level with intercept**

Null Hypothesis: TR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=22)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -33.46080 | 0.0000 |
| Test critical values: | 1% level | -3.435227 |  |
|  | 5% level | -2.863581 |  |
|  | 10% level | -2.567906 |  |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TR)
Method: Least Squares
Date: 05/30/09   Time: 12:01
Sample (adjusted): 1/06/2004 3/31/2009
Included observations: 1285 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TR(-1) | -0.933139 | 0.027888 | -33.46080 | 0.0000 |
| C | -0.000771 | 0.000494 | -1.562287 | 0.1185 |
| R-squared | 0.466001 | Mean dependent var |  | 2.29E-05 |
| Adjusted R-squared | 0.465585 | S.D. dependent var |  | 0.024183 |
| S.E. of regression | 0.017679 | Akaike info criterion |  | -5.231347 |
| Sum squared resid | 0.400989 | Schwarz criterion |  | -5.223318 |
| Log likelihood | 3363.140 | F-statistic |  | 1119.625 |
| Durbin-Watson stat | 2.005855 | Prob(F-statistic) |  | 0.000000 |

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**2.3) Level with intercept and trend**

Null Hypothesis: TR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=22)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -33.58031 | 0.0000 |
| Test critical values: | 1% level | -3.965203 |  |
|  | 5% level | -3.413312 |  |
|  | 10% level | -3.128684 |  |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TR)
Method: Least Squares
Date: 05/30/09   Time: 12:02
Sample (adjusted): 1/06/2004 3/31/2009
Included observations: 1285 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TR(-1) | -0.937239 | 0.027910 | -33.58031 | 0.0000 |
| C | 0.001089 | 0.000986 | 1.104869 | 0.2694 |
| @TREND(1/05/2004) | -2.90E-06 | 1.33E-06 | -2.179065 | 0.0295 |
| R-squared | 0.467971 | Mean dependent var | | 2.29E-05 |
| Adjusted R-squared | 0.467141 | S.D. dependent var | | 0.024183 |
| S.E. of regression | 0.017653 | Akaike info criterion | | -5.233487 |
| Sum squared resid | 0.399509 | Schwarz criterion | | -5.221444 |
| Log likelihood | 3365.515 | F-statistic | | 563.8222 |
| Durbin-Watson stat | 2.004599 | Prob(F-statistic) | | 0.000000 |

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 5.1

**ภาคผนวก ข**

**การประมาณค่าพารามิเตอร์**

## 1) การประมาณค่าพารามิเตอร์ จากแบบจำลอง ARMA-GARCH-M

### 1.1) การประมาณค่าพารามิเตอร์ของอัตราผลตอบแทนดัชนีหุ้นกลุ่มพลังงาน

Dependent Variable: EN
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 06/09/09   Time: 14:08
Sample (adjusted): 1/19/2004 3/31/2009
Included observations: 1276 after adjustments
Convergence achieved after 21 iterations
MA backcast: 1/05/2004 1/16/2004, Variance backcast: ON
GARCH = C(7) + C(8)*RESID(-1)^2 + C(9)*GARCH(-1)

|  | Coefficient | Std. Error | z-Statistic | Prob. |
|---|---|---|---|---|
| @SQRT(GARCH) | 0.051461 | 0.169901 | 0.302886 | 0.7620 |
| C | -0.000333 | 0.003116 | -0.107025 | 0.9148 |
| AR(6) | -0.566376 | 0.093832 | -6.036038 | 0.0000 |
| AR(10) | -0.420114 | 0.093456 | -4.495326 | 0.0000 |
| MA(6) | 0.540335 | 0.095613 | 5.651288 | 0.0000 |
| MA(10) | 0.440041 | 0.096616 | 4.554521 | 0.0000 |

| Variance Equation | | | | |
|---|---|---|---|---|
| C | 9.00E-05 | 1.24E-05 | 7.242338 | 0.0000 |
| RESID(-1)^2 | 0.202135 | 0.035237 | 5.736509 | 0.0000 |
| GARCH(-1) | 0.579904 | 0.056800 | 10.20953 | 0.0000 |

| R-squared | 0.010243 | Mean dependent var | -5.20E-05 |
|---|---|---|---|
| Adjusted R-squared | 0.003993 | S.D. dependent var | 0.019820 |
| S.E. of regression | 0.019780 | Akaike info criterion | -5.196145 |
| Sum squared resid | 0.495734 | Schwarz criterion | -5.159811 |
| Log likelihood | 3324.141 | F-statistic | 1.638973 |
| Durbin-Watson stat | 1.986035 | Prob(F-statistic) | 0.109287 |

| Inverted AR Roots | .88-.37i | .88+.37i | .54-.65i | .54+.65i |
|---|---|---|---|---|
| | -.00-1.00i | -.00+1.00i | -.54+.65i | -.54-.65i |
| | -.88+.37i | -.88-.37i | | |
| Inverted MA Roots | .88+.37i | .88-.37i | .54-.66i | .54+.66i |
| | -.00-1.00i | -.00+1.00i | -.54+.66i | -.54-.66i |
| | -.88+.37i | -.88-.37i | | |

**1.2) การประมาณค่าพารามิเตอร์ของอัตราผลตอบแทนดัชนีหุ้นกลุ่มขนส่ง**

Dependent Variable: TR
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 05/27/09   Time: 21:01
Sample (adjusted): 2/02/2004 3/31/2009
Included observations: 1266 after adjustments
Convergence achieved after 37 iterations
MA backcast: 1/05/2004 1/30/2004, Variance backcast: ON
GARCH = C(7) + C(8)*RESID(-1)^2 + C(9)*GARCH(-1)

|  | Coefficient | Std. Error | z-Statistic | Prob. |
|---|---|---|---|---|
| @SQRT(GARCH) | 0.073224 | 0.136101 | 0.538016 | 0.5906 |
| C | -0.001299 | 0.002035 | -0.638443 | 0.5232 |
| AR(9) | -0.313235 | 0.049436 | -6.336197 | 0.0000 |
| AR(20) | 0.569770 | 0.053702 | 10.60989 | 0.0000 |
| MA(9) | 0.349247 | 0.044143 | 7.911793 | 0.0000 |
| MA(20) | -0.611287 | 0.047199 | -12.95130 | 0.0000 |

| Variance Equation | | | | |
|---|---|---|---|---|
| C | 1.24E-05 | 3.10E-06 | 4.003802 | 0.0001 |
| RESID(-1)^2 | 0.075168 | 0.012003 | 6.262175 | 0.0000 |
| GARCH(-1) | 0.877274 | 0.022079 | 39.73377 | 0.0000 |

| R-squared | 0.025844 | Mean dependent var | -0.000827 |
|---|---|---|---|
| Adjusted R-squared | 0.019644 | S.D. dependent var | 0.017526 |
| S.E. of regression | 0.017353 | Akaike info criterion | -5.511245 |
| Sum squared resid | 0.378497 | Schwarz criterion | -5.474679 |
| Log likelihood | 3497.618 | F-statistic | 4.168478 |
| Durbin-Watson stat | 1.825142 | Prob(F-statistic) | 0.000062 |

| Inverted AR Roots | .95 | .94+.31i | .94-.31i | .78+.55i |
|---|---|---|---|---|
|  | .78-.55i | .56-.81i | .56+.81i | .32-.91i |
|  | .32+.91i | -.02-.97i | -.02+.97i | -.28+.94i |
|  | -.28-.94i | -.58+.77i | -.58-.77i | -.79-.59i |
|  | -.79+.59i | -.91+.29i | -.91-.29i | -.99 |
| Inverted MA Roots | .96 | .95+.31i | .95-.31i | .78-.55i |
|  | .78+.55i | .57-.81i | .57+.81i | .32+.91i |
|  | .32-.91i | -.02+.97i | -.02-.97i | -.28+.94i |
|  | -.28-.94i | -.58+.77i | -.58-.77i | -.80+.59i |
|  | -.80-.59i | -.91-.29i | -.91+.29i | -1.00 |

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## ภาคผนวก ค

## ผลการทดสอบ Unit Root Test ของความผันผวน โดยการทดสอบ ADF

**1) ผลการทดสอบ Unit Root Test ของความผันผวนของอัตราผลตอบแทนหุ้นกลุ่มพลังงาน**

### 1.1) Level with intercept

Null Hypothesis: H_EN has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=22)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -13.16291 | 0.0000 |
| Test critical values: | 1% level | -3.435271 |  |
|  | 5% level | -2.863601 |  |
|  | 10% level | -2.567917 |  |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(H_EN)
Method: Least Squares
Date: 06/11/09   Time: 16:56
Sample (adjusted): 1/21/2004 3/31/2009
Included observations: 1274 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| H_EN(-1) | -0.240242 | 0.018251 | -13.16291 | 0.0000 |
| D(H_EN(-1)) | 0.118915 | 0.027864 | 4.267679 | 0.0000 |
| C | 9.66E-05 | 1.03E-05 | 9.363847 | 0.0000 |
| R-squared | 0.119967 | Mean dependent var | | 2.33E-07 |
| Adjusted R-squared | 0.118582 | S.D. dependent var | | 0.000276 |
| S.E. of regression | 0.000259 | Akaike info criterion | | -13.67423 |
| Sum squared resid | 8.55E-05 | Schwarz criterion | | -13.66210 |
| Log likelihood | 8713.484 | F-statistic | | 86.63224 |
| Durbin-Watson stat | 1.990598 | Prob(F-statistic) | | 0.000000 |

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 5.1

### 1.2) Level without intercept and trend

Null Hypothesis: H_EN has a unit root
Exogenous: None
Lag Length: 11 (Automatic based on SIC, MAXLAG=22)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -3.461408 | 0.0005 |
| Test critical values: | 1% level | -2.566793 | |
| | 5% level | -1.941074 | |
| | 10% level | -1.616531 | |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(H_EN)
Method: Least Squares
Date: 06/11/09   Time: 16:58
Sample (adjusted): 2/04/2004 3/31/2009
Included observations: 1264 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| H_EN(-1) | -0.051863 | 0.014983 | -3.461408 | 0.0006 |
| D(H_EN(-1)) | -0.055971 | 0.030394 | -1.841546 | 0.0658 |
| D(H_EN(-2)) | -0.200373 | 0.030306 | -6.611752 | 0.0000 |
| D(H_EN(-3)) | -0.176623 | 0.030497 | -5.791467 | 0.0000 |
| D(H_EN(-4)) | -0.186850 | 0.030382 | -6.150040 | 0.0000 |
| D(H_EN(-5)) | -0.113557 | 0.030286 | -3.749446 | 0.0002 |
| D(H_EN(-6)) | -0.149736 | 0.029915 | -5.005419 | 0.0000 |
| D(H_EN(-7)) | -0.153666 | 0.029847 | -5.148383 | 0.0000 |
| D(H_EN(-8)) | -0.148244 | 0.029399 | -5.042514 | 0.0000 |
| D(H_EN(-9)) | -0.108339 | 0.028985 | -3.737720 | 0.0002 |
| D(H_EN(-10)) | -0.047991 | 0.028260 | -1.698222 | 0.0897 |
| D(H_EN(-11)) | -0.100868 | 0.028135 | -3.585184 | 0.0003 |

| | | | |
|---|---|---|---|
| R-squared | 0.123557 | Mean dependent var | 4.85E-08 |
| Adjusted R-squared | 0.115857 | S.D. dependent var | 0.000277 |
| S.E. of regression | 0.000261 | Akaike info criterion | -13.65714 |
| Sum squared resid | 8.51E-05 | Schwarz criterion | -13.60833 |
| Log likelihood | 8643.314 | Durbin-Watson stat | 2.007716 |

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**1.3) Level with intercept and trend**

Null Hypothesis: H_EN has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=22)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -13.65123 | 0.0000 |
| Test critical values: | 1% level | -3.965265 | |
| | 5% level | -3.413342 | |
| | 10% level | -3.128702 | |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(H_EN)
Method: Least Squares
Date: 06/11/09   Time: 16:55
Sample (adjusted): 1/21/2004 3/31/2009
Included observations: 1274 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| H_EN(-1) | -0.256232 | 0.018770 | -13.65123 | 0.0000 |
| D(H_EN(-1)) | 0.127030 | 0.027850 | 4.561218 | 0.0000 |
| C | 5.80E-05 | 1.53E-05 | 3.800378 | 0.0002 |
| @TREND(1/05/2004) | 6.93E-08 | 2.03E-08 | 3.412180 | 0.0007 |

| | | | |
|---|---|---|---|
| R-squared | 0.127962 | Mean dependent var | 2.33E-07 |
| Adjusted R-squared | 0.125902 | S.D. dependent var | 0.000276 |
| S.E. of regression | 0.000258 | Akaike info criterion | -13.68178 |
| Sum squared resid | 8.47E-05 | Schwarz criterion | -13.66562 |
| Log likelihood | 8719.297 | F-statistic | 62.11944 |
| Durbin-Watson stat | 1.992542 | Prob(F-statistic) | 0.000000 |

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**2) ผลการทดสอบ Unit Root Test ของความผันผวนของหุ้นกลุ่มขนส่ง**

**1.1) Level without intercept and trend**

Null Hypothesis: H_TR has a unit root
Exogenous: None
Lag Length: 1 (Automatic based on SIC, MAXLAG=22)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -3.984501 | 0.0001 |
| Test critical values: | 1% level | -2.566793 |  |
|  | 5% level | -1.941074 |  |
|  | 10% level | -1.616531 |  |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(H_TR)
Method: Least Squares
Date: 06/12/09   Time: 09:12
Sample (adjusted): 2/04/2004 3/31/2009
Included observations: 1264 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| H_TR(-1) | -0.018813 | 0.004721 | -3.984501 | 0.0001 |
| D(H_TR(-1)) | 0.164952 | 0.027692 | 5.956624 | 0.0000 |
| R-squared | 0.036763 | Mean dependent var | | -5.53E-07 |
| Adjusted R-squared | 0.035999 | S.D. dependent var | | 6.74E-05 |
| S.E. of regression | 6.62E-05 | Akaike info criterion | | -16.40659 |
| Sum squared resid | 5.53E-06 | Schwarz criterion | | -16.39845 |
| Log likelihood | 10370.96 | Durbin-Watson stat | | 1.991717 |

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**1.2) Level with intercept**

Null Hypothesis: H_TR has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=22)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -5.608040 | 0.0000 |
| Test critical values: | 1% level | -3.435311 |  |
|  | 5% level | -2.863619 |  |
|  | 10% level | -2.567926 |  |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(H_TR)
Method: Least Squares
Date: 06/12/09   Time: 09:13
Sample (adjusted): 2/04/2004 3/31/2009
Included observations: 1264 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| H_TR(-1) | -0.038593 | 0.006882 | -5.608040 | 0.0000 |
| D(H_TR(-1)) | 0.174528 | 0.027643 | 6.313752 | 0.0000 |
| C | 1.07E-05 | 2.71E-06 | 3.931114 | 0.0001 |
| R-squared | 0.048424 | Mean dependent var | -5.53E-07 |
| Adjusted R-squared | 0.046915 | S.D. dependent var | 6.74E-05 |
| S.E. of regression | 6.58E-05 | Akaike info criterion | -16.41719 |
| Sum squared resid | 5.46E-06 | Schwarz criterion | -16.40498 |
| Log likelihood | 10378.66 | F-statistic | 32.08511 |
| Durbin-Watson stat | 1.995308 | Prob(F-statistic) | 0.000000 |

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 5.1

### 1.3) Level with intercept and trend

Null Hypothesis: H_TR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=22)

|  |  | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic |  | -5.866772 | 0.0000 |
| Test critical values: | 1% level | -3.965323 |  |
|  | 5% level | -3.413370 |  |
|  | 10% level | -3.128719 |  |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(H_TR)
Method: Least Squares
Date: 06/12/09   Time: 09:14
Sample (adjusted): 2/04/2004 3/31/2009
Included observations: 1264 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| H_TR(-1) | -0.041414 | 0.007059 | -5.866772 | 0.0000 |
| D(H_TR(-1)) | 0.175049 | 0.027621 | 6.337550 | 0.0000 |
| C | 5.47E-06 | 4.00E-06 | 1.368747 | 0.1713 |
| @TREND(1/05/2004) | 9.19E-09 | 5.20E-09 | 1.765776 | 0.0777 |

| R-squared | 0.050773 | Mean dependent var | -5.53E-07 |
|---|---|---|---|
| Adjusted R-squared | 0.048513 | S.D. dependent var | 6.74E-05 |
| S.E. of regression | 6.58E-05 | Akaike info criterion | -16.41808 |
| Sum squared resid | 5.45E-06 | Schwarz criterion | -16.40180 |
| Log likelihood | 10380.22 | F-statistic | 22.46532 |
| Durbin-Watson stat | 1.995632 | Prob(F-statistic) | 0.000000 |

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 5.1

## ภาคผนวก ง

## การประมาณค่าแบบวิธีกำลังสองน้อยสุด (OLS)

1) ในกรณีที่ความผันผวนของหุ้นกลุ่มพลังงานเป็นตัวแปรต้น และความผันผวนของหุ้นกลุ่ม
ขนส่งเป็นตัวแปรตาม

Dependent Variable: H_TR
Method: Least Squares
Date: 06/09/09   Time: 17:44
Sample (adjusted): 2/03/2004 3/31/2009
Included observations: 1265 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| C | -3.68E-06 | 2.02E-06 | -1.824321 | 0.0683 |
| H_EN | 0.144061 | 0.004074 | 35.36019 | 0.0000 |
| H_EN(-2) | -0.065749 | 0.004484 | -14.66273 | 0.0000 |
| H_TR(-1) | 0.901669 | 0.007176 | 125.6531 | 0.0000 |

| | | | | |
|----------|-------------|------------|-------------|-------|
| R-squared | 0.969787 | Mean dependent var | | 0.000288 |
| Adjusted R-squared | 0.969715 | S.D. dependent var | | 0.000271 |
| S.E. of regression | 4.71E-05 | Akaike info criterion | | -17.08507 |
| Sum squared resid | 2.80E-06 | Schwarz criterion | | -17.06880 |
| Log likelihood | 10810.30 | F-statistic | | 13492.08 |
| Durbin-Watson stat | 1.988667 | Prob(F-statistic) | | 0.000000 |

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 5.1

**2) ในกรณีที่ความผันผวนของหุ้นกลุ่มขนส่งเป็นตัวแปรต้น และความผันผวนของหุ้นกลุ่ม
พลังงานเป็นตัวแปรตาม**

Dependent Variable: H_EN
Method: Least Squares
Date: 06/09/09   Time: 17:41
Sample (adjusted): 2/03/2004 3/31/2009
Included observations: 1265 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| C | 4.37E-05 | 6.32E-06 | 6.920377 | 0.0000 |
| H_TR | 3.185650 | 0.063489 | 50.17665 | 0.0000 |
| H_EN(-1) | 0.699948 | 0.014177 | 49.37263 | 0.0000 |
| H_TR(-1) | -2.912408 | 0.064773 | -44.96296 | 0.0000 |

| | | | |
|----------|-------------|------------|-------------|
| R-squared | 0.873470 | Mean dependent var | 0.000402 |
| Adjusted R-squared | 0.873169 | S.D. dependent var | 0.000423 |
| S.E. of regression | 0.000151 | Akaike info criterion | -14.76019 |
| Sum squared resid | 2.86E-05 | Schwarz criterion | -14.74393 |
| Log likelihood | 9339.821 | F-statistic | 2901.672 |
| Durbin-Watson stat | 1.932527 | Prob(F-statistic) | 0.000000 |

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 5.1

**ภาคผนวก จ**

**ผลการทดสอบ Granger Causality**

**ผลการทดสอบ Granger Causality ของผลตอบแทนของหุ้นกลุ่มพลังงานและกลุ่มขนส่ง**

Pairwise Granger Causality Tests
Date: 06/09/09   Time: 17:38
Sample: 1/05/2004 3/31/2009
Lags: 2

| Null Hypothesis: | Obs | F-Statistic | Probability |
|---|---|---|---|
| H_TR does not Granger Cause H_EN | 1264 | 17.1897 | 4.3E-08 |
| H_EN does not Granger Cause H_TR | | 3.42491 | 0.03286 |

ที่มา: การคำนวณโดยใช้โปรแกรม EVIEWS 5.1

# ประวัติผู้เขียน

**ชื่อ**                           นางสาวประไพศรี ทิพย์แก้ว

**วัน เดือน ปี เกิด**              28 มกราคม 2528

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