Q4. VAR Modelling

Since the data is yearly we take the max lag up to 2 to go for unit root test and used AIC as the decision criterion.

We have used the log transformation of each of the variables to go for the further analysis

**Unit Root Test**

**Health Expenditure Total of GDP**

At level it has a unit root but on first difference it becomes stationary, so lnHealth\_Expenditure\_Total\_of\_GDP is a I(1) process

Initially

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Null Hypothesis: LNHEALTH\_EXPENDITURE\_\_TOTAL\_\_\_\_OF\_GDP\_ has a unit root | | | | |
| Exogenous: Constant | | |  |  |
| Lag Length: 1 (Automatic - based on AIC, maxlag=2) | | | | |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic | Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | | | -1.526448 | 0.4950 |
| Test critical values: | 1% level |  | -3.920350 |  |
|  | 5% level |  | -3.065585 |  |
|  | 10% level |  | -2.673459 |  |
|  |  |  |  |  |
|  |  |  |  |  |

After applying first difference

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Null Hypothesis: D(LNHEALTH\_EXPENDITURE\_\_TOTAL\_\_\_\_OF\_GDP\_) has a unit root | | | | |
| Exogenous: Constant | | |  |  |
| Lag Length: 1 (Automatic - based on AIC, maxlag=2) | | | | |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic | Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | | | -4.765968 | 0.0023 |
| Test critical values: | 1% level |  | -3.959148 |  |
|  | 5% level |  | -3.081002 |  |
|  | 10% level |  | -2.681330 |  |
|  |  |  |  |  |
|  |  |  |  |  |

**Health Expenditure per Capita**

At level it has a unit root but on first difference it becomes stationary, so lnHealth\_Expenditure\_per\_Capita is a I(1) process

Initially

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Null Hypothesis: LNHEALTH\_EXPENDITURE\_PER\_CAPITA\_\_PPP\_\_CONSTANT\_2011\_INTERNATIONAL has a unit root | | | | |
| Exogenous: Constant | | |  |  |
| Lag Length: 0 (Automatic - based on AIC, maxlag=2) | | | | |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic | Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | | | 1.468057 | 0.9983 |
| Test critical values: | 1% level |  | -3.886751 |  |
|  | 5% level |  | -3.052169 |  |
|  | 10% level |  | -2.666593 |  |
|  |  |  |  |  |
|  |  |  |  |  |

After applying first diff

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Null Hypothesis: D(LNHEALTH\_EXPENDITURE\_PER\_CAPITA\_\_PPP\_\_CONSTANT\_2011\_INTERNATIONAL) has a unit root | | | | |
| Exogenous: Constant | | |  |  |
| Lag Length: 0 (Automatic - based on AIC, maxlag=2) | | | | |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic | Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | | | -3.392653 | 0.0273 |
| Test critical values: | 1% level |  | -3.920350 |  |
|  | 5% level |  | -3.065585 |  |
|  | 10% level |  | -2.673459 |  |
|  |  |  |  |  |
|  |  |  |  |  |

**Out of Pocket Health Expenditure Private**

At level it has a unit root but on first difference it becomes stationary, so lnOut\_of\_Pocket\_Health\_Expenditure\_Privateis a I(1) process.

Initially

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Null Hypothesis: LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_PRIVATE\_EXPENDITURE\_ON\_HE has a unit root | | | | |
| Exogenous: Constant | | |  |  |
| Lag Length: 0 (Automatic - based on AIC, maxlag=2) | | | | |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic | Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | | | -1.286957 | 0.6103 |
| Test critical values: | 1% level |  | -3.886751 |  |
|  | 5% level |  | -3.052169 |  |
|  | 10% level |  | -2.666593 |  |

After applying first diff

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Null Hypothesis: D(LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_PRIVATE\_EXPENDITURE\_ON\_HE) has a unit root | | | | |
| Exogenous: Constant | | |  |  |
| Lag Length: 0 (Automatic - based on AIC, maxlag=2) | | | | |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic | Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | | | -3.742728 | 0.0141 |
| Test critical values: | 1% level |  | -3.920350 |  |
|  | 5% level |  | -3.065585 |  |
|  | 10% level |  | -2.673459 |  |

**Out of Pocket Health Expenditure Of Total Expenditure**

At level it has a unit root but on first difference it becomes stationary, so lnOut\_of\_Pocket\_Health\_Expenditure\_of\_Total\_Expenditureis a I(1) process.

Initially

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Null Hypothesis: LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_TOTAL\_EXPENDITURE\_ON\_HEAL has a unit root | | | | |
| Exogenous: Constant | | |  |  |
| Lag Length: 0 (Automatic - based on AIC, maxlag=2) | | | | |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic | Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | | | -0.824025 | 0.7862 |
| Test critical values: | 1% level |  | -3.886751 |  |
|  | 5% level |  | -3.052169 |  |
|  | 10% level |  | -2.666593 |  |
|  |  |  |  |  |
|  |  |  |  |  |

After applying first diff

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Null Hypothesis: D(LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_TOTAL\_EXPENDITURE\_ON\_HEAL) has a unit root | | | | |
| Exogenous: Constant | | |  |  |
| Lag Length: 1 (Automatic - based on AIC, maxlag=2) | | | | |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  | t-Statistic | Prob.\* |
|  |  |  |  |  |
|  |  |  |  |  |
| Augmented Dickey-Fuller test statistic | | | -3.398498 | 0.0282 |
| Test critical values: | 1% level |  | -3.959148 |  |
|  | 5% level |  | -3.081002 |  |
|  | 10% level |  | -2.681330 |  |
|  |  |  |  |  |
|  |  |  |  |  |

**Optimal Lag length Estimation using Unrestricted VAR**

Since AIC criteria is less than SC, therefore we choose AIC as the decision criteria for choosing the optimal lag

|  |  |
| --- | --- |
| Akaike information criterion | -22.40482 |
| Schwarz criterion | -20.66650 |

AIC criteria yielded the optimal lag length to be chosen as 2.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| VAR Lag Order Selection Criteria | | | |  |  |  |
| Endogenous variables: LNHEALTH\_EXPENDITURE\_\_TOTAL\_\_\_\_OF\_GDP\_ LNHEALTH\_EXPENDITURE\_PER\_CAPITA\_\_PPP\_\_CONSTANT\_2011\_INTERNATIONAL LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_PRIVATE\_EXPENDITURE\_ON\_HE LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_TOTAL\_EXPENDITURE\_ON\_HEAL | | | | | | |
| Exogenous variables: C | | |  |  |  |  |
| Date: 11/16/18 Time: 14:47 | | |  |  |  |  |
| Sample: 1997 2014 | | |  |  |  |  |
| Included observations: 16 | | |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| Lag | LogL | LR | FPE | AIC | SC | HQ |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| 0 | 125.6749 | NA | 2.92e-12 | -15.20936 | -15.01621 | -15.19947 |
| 1 | 185.4304 | 82.16390\* | 1.34e-14 | -20.67880 | -19.71307 | -20.62935 |
| 2 | 215.2386 | 26.08213 | 3.95e-15\* | -22.40482\* | -20.66650\* | -22.31581\* |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

**VAR Equations**

**Equation-1:** When lnHealth\_Expenditure\_of\_Total\_GDP is taken as dependent variable

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Equation: LNHEALTH\_EXPENDITURE\_\_TOTAL\_\_\_\_OF\_GDP\_ = C(1) | | | | |
| \*LNHEALTH\_EXPENDITURE\_\_TOTAL\_\_\_\_OF\_GDP\_(-1) + C(2) | | | | |
| \*LNHEALTH\_EXPENDITURE\_\_TOTAL\_\_\_\_OF\_GDP\_(-2) + C(3) | | | | |
| \*LNHEALTH\_EXPENDITURE\_PER\_CAPITA\_\_PPP\_\_CONSTANT\_201 | | | | |
| 1\_INTERNATIONAL(-1) + C(4)\*LNHEALTH\_EXPENDITURE\_PER\_CAP | | | | |
| ITA\_\_PPP\_\_CONSTANT\_2011\_INTERNATIONAL(-2) + C(5) | | | | |
| \*LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_PRIVATE\_E | | | | |
| XPENDITURE\_ON\_HE(-1) + C(6)\*LNOUT\_OF\_POCKET\_HEALTH\_EX | | | | |
| PENDITURE\_\_\_\_OF\_PRIVATE\_EXPENDITURE\_ON\_HE(-2) + C(7) | | | | |
| \*LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_TOTAL\_EX | | | | |
| PENDITURE\_ON\_HEAL(-1) + C(8)\*LNOUT\_OF\_POCKET\_HEALTH\_E | | | | |
| XPENDITURE\_\_\_\_OF\_TOTAL\_EXPENDITURE\_ON\_HEAL(-2) + C(9) | | | | |
| Observations: 16 | | |  |  |
| R-squared | 0.815593 | Mean dependent var | | 1.466581 |
| Adjusted R-squared | 0.604842 | S.D. dependent var | | 0.034337 |
| S.E. of regression | 0.021584 | Sum squared resid | | 0.003261 |
| Durbin-Watson stat | 1.812057 |  |  |  |

**Equation-2:** When lnHealth\_Expenditure\_per\_Capita is taken as dependent variable

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Equation: LNHEALTH\_EXPENDITURE\_PER\_CAPITA\_\_PPP\_\_CONSTANT | | | | |
| \_2011\_INTERNATIONAL = C(10)\*LNHEALTH\_EXPENDITURE\_\_TOTA | | | | |
| L\_\_\_\_OF\_GDP\_(-1) + C(11)\*LNHEALTH\_EXPENDITURE\_\_TOTAL\_\_\_ | | | | |
| \_OF\_GDP\_(-2) + C(12)\*LNHEALTH\_EXPENDITURE\_PER\_CAPITA\_\_P | | | | |
| PP\_\_CONSTANT\_2011\_INTERNATIONAL(-1) + C(13) | | | | |
| \*LNHEALTH\_EXPENDITURE\_PER\_CAPITA\_\_PPP\_\_CONSTANT\_201 | | | | |
| 1\_INTERNATIONAL(-2) + C(14)\*LNOUT\_OF\_POCKET\_HEALTH\_EXPE | | | | |
| NDITURE\_\_\_\_OF\_PRIVATE\_EXPENDITURE\_ON\_HE(-1) + C(15) | | | | |
| \*LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_PRIVATE\_E | | | | |
| XPENDITURE\_ON\_HE(-2) + C(16)\*LNOUT\_OF\_POCKET\_HEALTH\_E | | | | |
| XPENDITURE\_\_\_\_OF\_TOTAL\_EXPENDITURE\_ON\_HEAL(-1) + C(17) | | | | |
| \*LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_TOTAL\_EX | | | | |
| PENDITURE\_ON\_HEAL(-2) + C(18) | | | |  |
| Observations: 16 | | |  |  |
| R-squared | 0.998328 | Mean dependent var | | 4.946918 |
| Adjusted R-squared | 0.996416 | S.D. dependent var | | 0.389340 |
| S.E. of regression | 0.023308 | Sum squared resid | | 0.003803 |
| Durbin-Watson stat | 2.014664 |  |  |  |

**Equation-3:** When ln Out\_of\_Pocket\_Health\_Expenditure\_Private is taken as dependent variable

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Equation: LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_PRIVA | | | | |
| TE\_EXPENDITURE\_ON\_HE = C(19)\*LNHEALTH\_EXPENDITURE\_\_T | | | | |
| OTAL\_\_\_\_OF\_GDP\_(-1) + C(20)\*LNHEALTH\_EXPENDITURE\_\_TOTAL | | | | |
| \_\_\_\_OF\_GDP\_(-2) + C(21)\*LNHEALTH\_EXPENDITURE\_PER\_CAPITA | | | | |
| \_\_PPP\_\_CONSTANT\_2011\_INTERNATIONAL(-1) + C(22) | | | | |
| \*LNHEALTH\_EXPENDITURE\_PER\_CAPITA\_\_PPP\_\_CONSTANT\_201 | | | | |
| 1\_INTERNATIONAL(-2) + C(23)\*LNOUT\_OF\_POCKET\_HEALTH\_EXPE | | | | |
| NDITURE\_\_\_\_OF\_PRIVATE\_EXPENDITURE\_ON\_HE(-1) + C(24) | | | | |
| \*LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_PRIVATE\_E | | | | |
| XPENDITURE\_ON\_HE(-2) + C(25)\*LNOUT\_OF\_POCKET\_HEALTH\_E | | | | |
| XPENDITURE\_\_\_\_OF\_TOTAL\_EXPENDITURE\_ON\_HEAL(-1) + C(26) | | | | |
| \*LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_TOTAL\_EX | | | | |
| PENDITURE\_ON\_HEAL(-2) + C(27) | | | |  |
| Observations: 16 | | |  |  |
| R-squared | 0.887504 | Mean dependent var | | 4.495188 |
| Adjusted R-squared | 0.758936 | S.D. dependent var | | 0.018520 |
| S.E. of regression | 0.009093 | Sum squared resid | | 0.000579 |
| Durbin-Watson stat | 2.280804 |  |  |  |

**Equation-4:** When lnOut\_of\_Pocket\_Health\_Expenditure\_of\_Total\_Expenditureis taken as dependent variable

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Equation: LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_TOTAL | | | | |
| \_EXPENDITURE\_ON\_HEAL = C(28)\*LNHEALTH\_EXPENDITURE\_\_T | | | | |
| OTAL\_\_\_\_OF\_GDP\_(-1) + C(29)\*LNHEALTH\_EXPENDITURE\_\_TOTAL | | | | |
| \_\_\_\_OF\_GDP\_(-2) + C(30)\*LNHEALTH\_EXPENDITURE\_PER\_CAPITA | | | | |
| \_\_PPP\_\_CONSTANT\_2011\_INTERNATIONAL(-1) + C(31) | | | | |
| \*LNHEALTH\_EXPENDITURE\_PER\_CAPITA\_\_PPP\_\_CONSTANT\_201 | | | | |
| 1\_INTERNATIONAL(-2) + C(32)\*LNOUT\_OF\_POCKET\_HEALTH\_EXPE | | | | |
| NDITURE\_\_\_\_OF\_PRIVATE\_EXPENDITURE\_ON\_HE(-1) + C(33) | | | | |
| \*LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_PRIVATE\_E | | | | |
| XPENDITURE\_ON\_HE(-2) + C(34)\*LNOUT\_OF\_POCKET\_HEALTH\_E | | | | |
| XPENDITURE\_\_\_\_OF\_TOTAL\_EXPENDITURE\_ON\_HEAL(-1) + C(35) | | | | |
| \*LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_TOTAL\_EX | | | | |
| PENDITURE\_ON\_HEAL(-2) + C(36) | | | |  |
| Observations: 16 | | |  |  |
| R-squared | 0.849389 | Mean dependent var | | 4.188973 |
| Adjusted R-squared | 0.677262 | S.D. dependent var | | 0.039696 |
| S.E. of regression | 0.022551 | Sum squared resid | | 0.003560 |
| Durbin-Watson stat | 1.676747 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Since there are a number of coeff which are not significant, therefore we apply Wald coeff test to get a parsimonious model.

From Eq-1 we remove C(7) and C(8)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
| Test Statistic | Value | df | Probability |
|  |  |  |  |
|  |  |  |  |
| Chi-square | 1.615942 | 2 | 0.4458 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Null Hypothesis: C(7)=C(8)=0 | | |  |
| Null Hypothesis Summary: | | |  |

FromEq-2 we remove C(14), C(15), C(16), C(17)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
| Test Statistic | Value | df | Probability |
|  |  |  |  |
|  |  |  |  |
| Chi-square | 3.958576 | 2 | 0.1382 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Null Hypothesis: C(14)=C(15)=0 | | |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
| Test Statistic | Value | df | Probability |
|  |  |  |  |
|  |  |  |  |
| Chi-square | 0.588144 | 2 | 0.7452 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Null Hypothesis: C(16)=C(17)=0 | | |  |

**From Eq-3 we remove C(19), C(20), C(21), C(22), C(25), C(26)**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
| Test Statistic | Value | df | Probability |
|  |  |  |  |
|  |  |  |  |
| Chi-square | 0.813401 | 2 | 0.6658 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Null Hypothesis: C(19)=C(20)=0 | | |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
| Test Statistic | Value | df | Probability |
|  |  |  |  |
|  |  |  |  |
| Chi-square | 1.214829 | 2 | 0.5448 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Null Hypothesis: C(21)=C(22)=0 | | |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
| Test Statistic | Value | df | Probability |
|  |  |  |  |
|  |  |  |  |
| Chi-square | 2.849263 | 2 | 0.2406 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Null Hypothesis: C(25)=C(26)=0 | | |  |

From eq-4 we remove C(28), C(29), C(30), C(31), C(32), C(33)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
| Test Statistic | Value | df | Probability |
|  |  |  |  |
|  |  |  |  |
| Chi-square | 0.586713 | 2 | 0.7458 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Null Hypothesis: C(28)=C(29)=0 | | |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
| Test Statistic | Value | df | Probability |
|  |  |  |  |
|  |  |  |  |
| Chi-square | 0.384313 | 2 | 0.8252 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Null Hypothesis: C(30)=C(31)=0 | | |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
| Test Statistic | Value | df | Probability |
|  |  |  |  |
|  |  |  |  |
| Chi-square | 0.393288 | 2 | 0.8215 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Null Hypothesis: C(32)=C(33)=0 | | |  |

Therefore the parsimonious Model is

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| System: UNTITLED | | |  |  |
| Estimation Method: Least Squares | | | |  |
| Date: 11/16/18 Time: 15:18 | | |  |  |
| Sample: 1999 2014 | | |  |  |
| Included observations: 16 | | |  |  |
| Total system (balanced) observations 64 | | | |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  | Coefficient | Std. Error | t-Statistic | Prob. |
|  |  |  |  |  |
|  |  |  |  |  |
| C(1) | 0.052990 | 0.373676 | 0.141808 | 0.8879 |
| C(2) | -1.236070 | 0.447157 | -2.764286 | 0.0082 |
| C(3) | -0.224779 | 0.314955 | -0.713686 | 0.4790 |
| C(4) | 0.439015 | 0.319593 | 1.373669 | 0.1762 |
| C(5) | 0.886926 | 0.889812 | 0.996756 | 0.3241 |
| C(6) | 1.922658 | 1.012044 | 1.899777 | 0.0637 |
| C(9) | -10.45765 | 3.877499 | -2.697008 | 0.0097 |
| C(10) | -0.610431 | 0.329570 | -1.852203 | 0.0704 |
| C(11) | -0.214037 | 0.460761 | -0.464530 | 0.6445 |
| C(12) | 0.991964 | 0.380094 | 2.609782 | 0.0122 |
| C(13) | 0.059819 | 0.391135 | 0.152937 | 0.8791 |
| C(18) | 1.035064 | 0.572903 | 1.806701 | 0.0774 |
| C(23) | 0.885678 | 0.274910 | 3.221706 | 0.0023 |
| C(24) | -0.048110 | 0.264262 | -0.182053 | 0.8563 |
| C(27) | 0.728735 | 0.558284 | 1.305312 | 0.1983 |
| C(34) | 1.131227 | 0.274025 | 4.128188 | 0.0002 |
| C(35) | -0.319030 | 0.277839 | -1.148254 | 0.2568 |
| C(36) | 0.783653 | 0.692800 | 1.131139 | 0.2639 |
|  |  |  |  |  |
|  |  |  |  |  |
| Determinant residual covariance | | 9.97E-16 |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| Equation: LNHEALTH\_EXPENDITURE\_\_TOTAL\_\_\_\_OF\_GDP\_ = C(1) | | | | |
| \*LNHEALTH\_EXPENDITURE\_\_TOTAL\_\_\_\_OF\_GDP\_(-1) + C(2) | | | | |
| \*LNHEALTH\_EXPENDITURE\_\_TOTAL\_\_\_\_OF\_GDP\_(-2) + C(3) | | | | |
| \*LNHEALTH\_EXPENDITURE\_PER\_CAPITA\_\_PPP\_\_CONSTANT\_201 | | | | |
| 1\_INTERNATIONAL(-1) + C(4)\*LNHEALTH\_EXPENDITURE\_PER\_CAP | | | | |
| ITA\_\_PPP\_\_CONSTANT\_2011\_INTERNATIONAL(-2) + C(5) | | | | |
| \*LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_PRIVATE\_E | | | | |
| XPENDITURE\_ON\_HE(-1) + C(6)\*LNOUT\_OF\_POCKET\_HEALTH\_EX | | | | |
| PENDITURE\_\_\_\_OF\_PRIVATE\_EXPENDITURE\_ON\_HE(-2) + C(9) | | | | |
| Observations: 16 | | |  |  |
| R-squared | 0.773023 | Mean dependent var | | 1.466581 |
| Adjusted R-squared | 0.621705 | S.D. dependent var | | 0.034337 |
| S.E. of regression | 0.021119 | Sum squared resid | | 0.004014 |
| Durbin-Watson stat | 1.698285 |  |  |  |
|  |  |  |  |  |
| Equation: LNHEALTH\_EXPENDITURE\_PER\_CAPITA\_\_PPP\_\_CONSTANT | | | | |
| \_2011\_INTERNATIONAL = C(10)\*LNHEALTH\_EXPENDITURE\_\_TOTA | | | | |
| L\_\_\_\_OF\_GDP\_(-1) + C(11)\*LNHEALTH\_EXPENDITURE\_\_TOTAL\_\_\_ | | | | |
| \_OF\_GDP\_(-2) + C(12)\*LNHEALTH\_EXPENDITURE\_PER\_CAPITA\_\_P | | | | |
| PP\_\_CONSTANT\_2011\_INTERNATIONAL(-1) + C(13) | | | | |
| \*LNHEALTH\_EXPENDITURE\_PER\_CAPITA\_\_PPP\_\_CONSTANT\_201 | | | | |
| 1\_INTERNATIONAL(-2) + C(18) | | | |  |
| Observations: 16 | | |  |  |
| R-squared | 0.996468 | Mean dependent var | | 4.946918 |
| Adjusted R-squared | 0.995183 | S.D. dependent var | | 0.389340 |
| S.E. of regression | 0.027022 | Sum squared resid | | 0.008032 |
| Durbin-Watson stat | 1.544262 |  |  |  |
|  |  |  |  |  |
| Equation: LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_PRIVA | | | | |
| TE\_EXPENDITURE\_ON\_HE = C(23)\*LNOUT\_OF\_POCKET\_HEALTH | | | | |
| \_EXPENDITURE\_\_\_\_OF\_PRIVATE\_EXPENDITURE\_ON\_HE(-1) + | | | | |
| C(24)\*LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_PRIVA | | | | |
| TE\_EXPENDITURE\_ON\_HE(-2) + C(27) | | | |  |
| Observations: 16 | | |  |  |
| R-squared | 0.783134 | Mean dependent var | | 4.495188 |
| Adjusted R-squared | 0.749770 | S.D. dependent var | | 0.018520 |
| S.E. of regression | 0.009264 | Sum squared resid | | 0.001116 |
| Durbin-Watson stat | 1.974123 |  |  |  |
|  |  |  |  |  |
| Equation: LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_TOTAL | | | | |
| \_EXPENDITURE\_ON\_HEAL = C(34)\*LNOUT\_OF\_POCKET\_HEALTH | | | | |
| \_EXPENDITURE\_\_\_\_OF\_TOTAL\_EXPENDITURE\_ON\_HEAL(-1) + | | | | |
| C(35)\*LNOUT\_OF\_POCKET\_HEALTH\_EXPENDITURE\_\_\_\_OF\_TOTA | | | | |
| L\_EXPENDITURE\_ON\_HEAL(-2) + C(36) | | | |  |
| Observations: 16 | | |  |  |
| R-squared | 0.714103 | Mean dependent var | | 4.188973 |
| Adjusted R-squared | 0.670119 | S.D. dependent var | | 0.039696 |
| S.E. of regression | 0.022799 | Sum squared resid | | 0.006758 |
| Durbin-Watson stat | 1.610622 |  |  |  |

**Diagnostics Checking**

Parsimonious model is normal from Jaque Bera test

Ho: Normally Distributed

H1: Not Normally Distributed

|  |  |  |  |
| --- | --- | --- | --- |
| Component | Jarque-Bera | df | Prob. |
|  |  |  |  |
|  |  |  |  |
| 1 | 1.365910 | 2 | 0.5051 |
| 2 | 0.931978 | 2 | 0.6275 |
| 3 | 1.009353 | 2 | 0.6037 |
| 4 | 0.119995 | 2 | 0.9418 |
|  |  |  |  |
|  |  |  |  |
| Joint | 3.427236 | 8 | 0.9048 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

There is no autocorrelation in parsimonious model as Ho is accepted.

Ho: No serial Correlation

H1: Serial Correlation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| System Residual Portmanteau Tests for Autocorrelations | | | | |  |
| Null Hypothesis: no residual autocorrelations up to lag h | | | | |  |
| Date: 11/16/18 Time: 15:22 | | |  |  |  |
| Sample: 1999 2014 | |  |  |  |  |
| Included observations: 16 | | |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Lags | Q-Stat | Prob. | Adj Q-Stat | Prob. | df |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| 1 | 5.314484 | 0.9940 | 5.668783 | 0.9913 | 16 |
| 2 | 13.88052 | 0.9978 | 15.45854 | 0.9939 | 32 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Overall Model is Normal from Jaque Bera yest where Ho is accepted

Ho: Normally Distributed

H1: Not Normally Distributed

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| Component | Jarque-Bera | df | Prob. |
|  |  |  |  |
|  |  |  |  |
| 1 | 8.293576 | 2 | 0.0158 |
| 2 | 0.837901 | 2 | 0.6577 |
| 3 | 0.757803 | 2 | 0.6846 |
| 4 | 0.961763 | 2 | 0.6182 |
|  |  |  |  |
|  |  |  |  |
| Joint | 10.85104 | 8 | 0.2103 |
|  |  |  |  |
|  |  |  |  |
| Bu t |  |  |  |

But the over parameterised model has auto correlation, H1 accepted

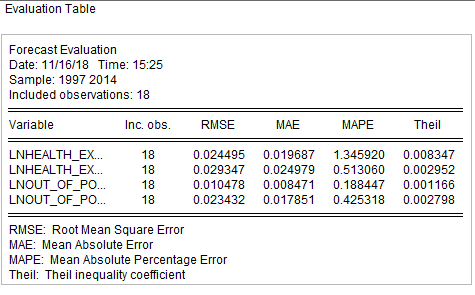
Ho: No serial Correlation

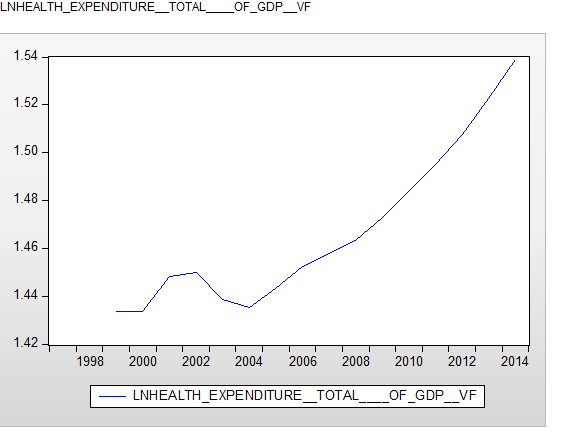
H1: Serial Correlation

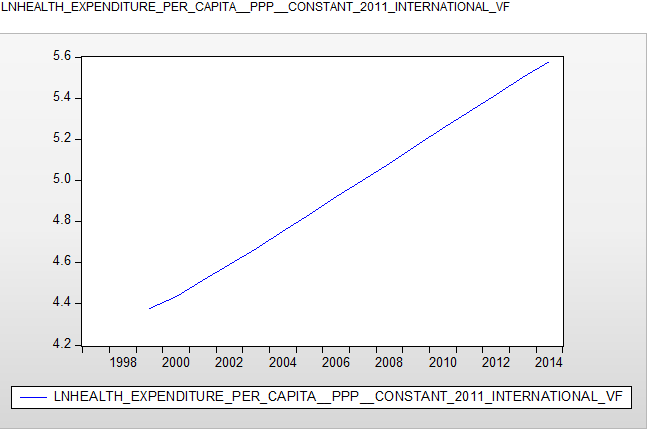
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| VAR Residual Serial Correlation LM Tests | | | | |  |  |
| Date: 11/16/18 Time: 15:23 | | | |  |  |  |
| Sample: 1997 2014 | | |  |  |  |  |
| Included observations: 16 | | | |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| Null hypothesis: No serial correlation at lag h |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| Lag | LRE\* stat | df | Prob. | Rao F-stat | df | Prob. |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| 1 | 112.1931 | 16 | 0.0000 | 95504.94 | (16, 0.6) | 0.0198 |
| 2 | NA | 16 | NA | NA | (16, NA) | NA |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

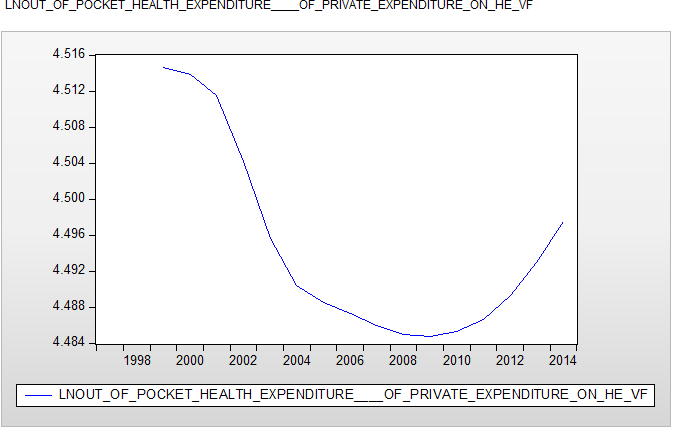
Therefore we can say that the parsimonious model is good model to choose.

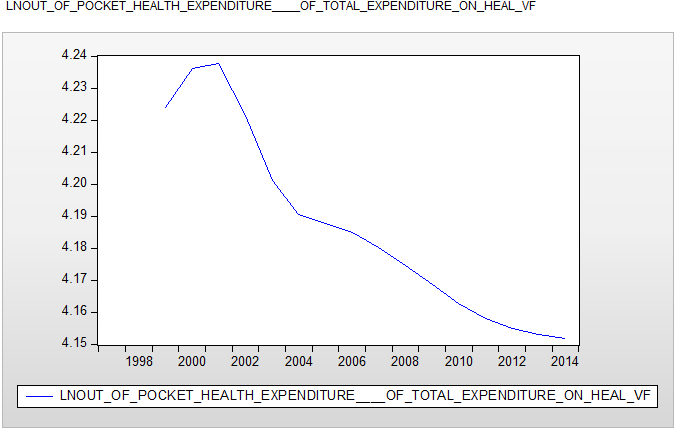
**Dynamic/Alternate Scenario VAR Forecast**











**Static Scenario VAR Forecast**

