2.

AR(1):

|  |  |  |  |
| --- | --- | --- | --- |
|  | Alpha | Beta1 | Sigma |
| 1 | 5.1463 | 0.9482 | 0.7018 |
| 2 | 11.6280 | 0.8848 | 0.2510 |
| 3 | 1.3769 | 0.9864 | 0.1724 |
| 4 | 0.4038 | 0.9961 | 0.1597 |
| 5 | 3.3407 | 0.9669 | 0.2664 |

AR(2):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Alpha | Beta1 | Beta2 | Sigma |
| 1 | 5.0238 | 0.9316 | 0.0177 | 0.6729 |
| 2 | 9.9070 | 0.8881 | 0.0136 | 0.2627 |
| 3 | 1.4300 | 0.9505 | 0.0353 | 0.1738 |
| 4 | 0.5529 | 0.9897 | 0.0048 | 0.1569 |
| 5 | 3.7296 | 0.9397 | 0.0234 | 0.2692 |

AR(3):

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Alpha | Beta1 | Beta2 | Beta3 | Sigma |
| 1 | 5.0696 | 0.9318 | 0.0262 | -0.0091 | 0.6742 |
| 2 | 9.7276 | 0.8867 | -0.0067 | 0.0235 | 0.2630 |
| 3 | 1.3160 | 0.9501 | -0.0311 | 0.0679 | 0.1724 |
| 4 | 0.5388 | 0.9876 | -0.0083 | 0.0154 | 0.1570 |
| 5 | 3.8817 | 0.9399 | 0.0575 | -0.0358 | 0.2692 |

SESTAR(3):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Alpha | Beta | Delta | Gamma | Mu | Sigma |
| 1 | -44.7705 | 0.9464 | -0.0000 | 0.0007 | -298.1236 | 8.3572 |
| 2 | -73.1506 | 0.8777 | -0.0000 | 0.0018 | -86.9401 | 1.3480 |
| 3 | 289.3666 | -0.1038 | -0.1398 | -0.0001 | -775.8293 | 4.7811 |
| 4 | 362.0184 | -1.0646 | -0.4502 | 0.0004 | -934.8121 | 12.5902 |
| 5 | -224.7481 | 0.9597 | -0.0000 | 0.0011 | -499.0314 | 3.8359 |

3.

AR(1) = 1.2203

|  |  |
| --- | --- |
|  | Log Likelihood |
| 1 | 1.2419 |
| 2 | 0.7277 |
| 3 | 0.5399 |
| 4 | 0.5018 |
| 5 | 0.7576 |

AR(2)

|  |  |
| --- | --- |
|  | Log Likelihood |
| 1 | 1.2208 |
| 2 | 0.7507 |
| 3 | 0.5439 |
| 4 | 0.4928 |
| 5 | 0.7627 |

AR(3) = 1.2218

|  |  |
| --- | --- |
|  | Log Likelihood |
| 1 | 1.2218 |
| 2 | 0.7512 |
| 3 | 0.5399 |
| 4 | 0.4930 |
| 5 | 0.7627 |

SESTAR

|  |  |
| --- | --- |
|  | Log Likelihood |
| 1 | 1.2203 |
| 2 | 0.7501 |
| 3 | 0.5443 |
| 4 | 0.4924 |
| 5 | 0.7623 |

The SESTAR model has the highest and therefore the best likelihood. \*chico said something about negative likelihood and not making the mistake of getting confused with the minus sign\*

Sestar dynamics in the data???

4.

AR(1)

MSE = 8.8270

RMSE = 2.9710

|  |  |  |
| --- | --- | --- |
|  | MSE | RMSE |
| 1 | 8.1454 | 2.8540 |
| 2 | 8.7521 | 2.9584 |
| 3 | 16.4204 | 4.0522 |
| 4 | 35.5667 | 5.9638 |
| 5 | 23.7004 | 4.8683 |

AR(2)

|  |  |  |
| --- | --- | --- |
|  | MSE | RMSE |
| 1 | 5.8824 | 2.4254 |
| 2 | 10.6572 | 3.2645 |
| 3 | 9.1567 | 3.0260 |
| 4 | 13.2104 | 3.6346 |
| 5 | 8.9396 | 2.9899 |

AR(3)

|  |  |  |
| --- | --- | --- |
|  | MSE | RMSE |
| 1 | 7.6366 | 2.7634 |
| 2 | 9.2192 | 3.0363 |
| 3 | 13.5906 | 3.6865 |
| 4 | 15.6906 | 3.9611 |
| 5 | 8.3326 | 2.8866 |

SESTAR

|  |  |  |
| --- | --- | --- |
|  | MSE | RMSE |
| 1 | 0.1990 | 0.0014 |
| 2 | 0.2888 | 0.0017 |
| 3 | 0.0410 | 0.0006 |
| 4 | 0.2193 | 0.0015 |
| 5 | 1.0252 | 0.0032 |

The AR(2) model seems to be the best as it has the smallest MSE and RMSE.

5.

AR(1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| 1 | - |  |  |  |  |
| 2 | 0.9471 | - |  |  |  |
| 3 | 2.7328 | 4.1183 | - |  |  |
| 4 | 10.8109 | 14.0457 | 13.8043 | - |  |
| 5 | 4.1761 | 7.4640 | 5.5261 | -13.8105 | - |

AR(2)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| 1 | - |  |  |  |  |
| 2 | -6.2502 | - |  |  |  |
| 3 | 3.3787 | 8.2362 | - |  |  |
| 4 | 3.8172 | 9.2026 | 3.0957 | - |  |
| 5 | -2.6402 | 4.0959 | -8.6057 | -10.8889 | - |

AR(3)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| 1 | - |  |  |  |  |
| 2 | 5.0978 | - |  |  |  |
| 3 | 6.4055 | 6.9415 | - |  |  |
| 4 | 6.7149 | 7.3628 | -0.4201 | - |  |
| 5 | 2.7733 | -7.3847 | -8.9777 | -9.7194 | - |

SESTAR

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| 1 | - |  |  |  |  |
| 2 | 23.3853 | - |  |  |  |
| 3 | -19.9730 | -30.7044 | - |  |  |
| 4 | 0.6915 | -3.8319 | 8.7899 | - |  |
| 5 | 47.0648 | 47.4983 | 45.8804 | 30.6275 | - |