Forecaset Euribor

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R Markdown

This is a quick forecast of Euribor. Please do not use it. Only a dirty prediction.

```
#euribor <- read.csv("C:\\Users\\cmoreno\\Desktop\\Euribor\\euribor\\data\\euribor-12m-monthly.csv", se

# Read Euribor Dataset from Github
euribor <- read.csv("https://raw.githubusercontent.com/caiomsouza/forecast-euribor/master/euribor/data/
```

```
euribor
```

```
##          date   rate maturity_level granularity
## 1   1999-01-01  3.213            12m     monthly
## 2   1999-02-01  2.998            12m     monthly
## 3   1999-03-01  3.079            12m     monthly
## 4   1999-04-01  2.939            12m     monthly
## 5   1999-05-03  2.680            12m     monthly
## 6   1999-06-01  2.735            12m     monthly
## 7   1999-07-01  2.910            12m     monthly
## 8   1999-08-02  3.188            12m     monthly
## 9   1999-09-01  3.284            12m     monthly
## 10  1999-10-01  3.401            12m     monthly
## 11  1999-11-01  3.756            12m     monthly
## 12  1999-12-01  3.763            12m     monthly
## 13  2000-01-03  3.885            12m     monthly
## 14  2000-02-01  4.079            12m     monthly
## 15  2000-03-01  4.165            12m     monthly
## 16  2000-04-03  4.304            12m     monthly
## 17  2000-05-02  4.573            12m     monthly
## 18  2000-06-01  4.983            12m     monthly
## 19  2000-07-03  5.041            12m     monthly
## 20  2000-08-01  5.164            12m     monthly
## 21  2000-09-01  5.261            12m     monthly
## 22  2000-10-02  5.173            12m     monthly
## 23  2000-11-01  5.272            12m     monthly
## 24  2000-12-01  5.054            12m     monthly
## 25  2001-01-02  4.692            12m     monthly
## 26  2001-02-01  4.505            12m     monthly
## 27  2001-03-01  4.532            12m     monthly
## 28  2001-04-02  4.314            12m     monthly
## 29  2001-05-02  4.728            12m     monthly
## 30  2001-06-01  4.396            12m     monthly
## 31  2001-07-02  4.305            12m     monthly
## 32  2001-08-01  4.215            12m     monthly
## 33  2001-09-03  3.976            12m     monthly
## 34  2001-10-01  3.493            12m     monthly
## 35  2001-11-01  3.193            12m     monthly
```

```
## 36   2001-12-03   3.183        12m      monthly
## 37   2002-01-02   3.312        12m      monthly
## 38   2002-02-01   3.633        12m      monthly
## 39   2002-03-01   3.617        12m      monthly
## 40   2002-04-02   3.994        12m      monthly
## 41   2002-05-02   3.771        12m      monthly
## 42   2002-06-03   3.999        12m      monthly
## 43   2002-07-01   3.723        12m      monthly
## 44   2002-08-01   3.479        12m      monthly
## 45   2002-09-02   3.365        12m      monthly
## 46   2002-10-01   3.062        12m      monthly
## 47   2002-11-01   3.069        12m      monthly
## 48   2002-12-02   3.010        12m      monthly
## 49   2003-01-02   2.734        12m      monthly
## 50   2003-02-03   2.658        12m      monthly
## 51   2003-03-03   2.360        12m      monthly
## 52   2003-04-01   2.373        12m      monthly
## 53   2003-05-02   2.355        12m      monthly
## 54   2003-06-02   2.151        12m      monthly
## 55   2003-07-01   2.021        12m      monthly
## 56   2003-08-01   2.232        12m      monthly
## 57   2003-09-01   2.314        12m      monthly
## 58   2003-10-01   2.117        12m      monthly
## 59   2003-11-03   2.391        12m      monthly
## 60   2003-12-01   2.503        12m      monthly
## 61   2004-01-02   2.275        12m      monthly
## 62   2004-02-02   2.251        12m      monthly
## 63   2004-03-01   2.092        12m      monthly
## 64   2004-04-01   1.978        12m      monthly
## 65   2004-05-03   2.230        12m      monthly
## 66   2004-06-01   2.332        12m      monthly
## 67   2004-07-01   2.387        12m      monthly
## 68   2004-08-02   2.353        12m      monthly
## 69   2004-09-01   2.275        12m      monthly
## 70   2004-10-01   2.372        12m      monthly
## 71   2004-11-01   2.300        12m      monthly
## 72   2004-12-01   2.278        12m      monthly
## 73   2005-01-03   2.343        12m      monthly
## 74   2005-02-01   2.288        12m      monthly
## 75   2005-03-01   2.344        12m      monthly
## 76   2005-04-01   2.335        12m      monthly
## 77   2005-05-02   2.202        12m      monthly
## 78   2005-06-01   2.140        12m      monthly
## 79   2005-07-01   2.091        12m      monthly
## 80   2005-08-01   2.221        12m      monthly
## 81   2005-09-01   2.197        12m      monthly
## 82   2005-10-03   2.334        12m      monthly
## 83   2005-11-01   2.551        12m      monthly
## 84   2005-12-01   2.756        12m      monthly
## 85   2006-01-02   2.855        12m      monthly
## 86   2006-02-01   2.900        12m      monthly
## 87   2006-03-01   2.991        12m      monthly
## 88   2006-04-03   3.254        12m      monthly
## 89   2006-05-02   3.314        12m      monthly
```

```
## 90  2006-06-01  3.369          12m      monthly
## 91  2006-07-03  3.507          12m      monthly
## 92  2006-08-01  3.542          12m      monthly
## 93  2006-09-01  3.636          12m      monthly
## 94  2006-10-02  3.748          12m      monthly
## 95  2006-11-01  3.832          12m      monthly
## 96  2006-12-01  3.851          12m      monthly
## 97  2007-01-02  4.030          12m      monthly
## 98  2007-02-01  4.080          12m      monthly
## 99  2007-03-01  4.077          12m      monthly
## 100 2007-04-02  4.193          12m      monthly
## 101 2007-05-01  4.298          12m      monthly
## 102 2007-06-01  4.466          12m      monthly
## 103 2007-07-02  4.524          12m      monthly
## 104 2007-08-01  4.522          12m      monthly
## 105 2007-09-03  4.783          12m      monthly
## 106 2007-10-01  4.716          12m      monthly
## 107 2007-11-01  4.630          12m      monthly
## 108 2007-12-03  4.711          12m      monthly
## 109 2008-01-02  4.733          12m      monthly
## 110 2008-02-01  4.330          12m      monthly
## 111 2008-03-03  4.379          12m      monthly
## 112 2008-04-01  4.735          12m      monthly
## 113 2008-05-02  4.952          12m      monthly
## 114 2008-06-02  5.097          12m      monthly
## 115 2008-07-01  5.418          12m      monthly
## 116 2008-08-01  5.357          12m      monthly
## 117 2008-09-01  5.325          12m      monthly
## 118 2008-10-01  5.505          12m      monthly
## 119 2008-11-03  4.845          12m      monthly
## 120 2008-12-01  3.921          12m      monthly
## 121 2009-01-02  3.025          12m      monthly
## 122 2009-02-02  2.259          12m      monthly
## 123 2009-03-02  2.025          12m      monthly
## 124 2009-04-01  1.801          12m      monthly
## 125 2009-05-04  1.718          12m      monthly
## 126 2009-06-01  1.626          12m      monthly
## 127 2009-07-01  1.497          12m      monthly
## 128 2009-08-03  1.346          12m      monthly
## 129 2009-09-01  1.302          12m      monthly
## 130 2009-10-01  1.237          12m      monthly
## 131 2009-11-02  1.237          12m      monthly
## 132 2009-12-01  1.236          12m      monthly
## 133 2010-01-04  1.251          12m      monthly
## 134 2010-02-01  1.226          12m      monthly
## 135 2010-03-01  1.216          12m      monthly
## 136 2010-04-01  1.214          12m      monthly
## 137 2010-05-03  1.239          12m      monthly
## 138 2010-06-01  1.262          12m      monthly
## 139 2010-07-01  1.320          12m      monthly
## 140 2010-08-02  1.418          12m      monthly
## 141 2010-09-01  1.411          12m      monthly
## 142 2010-10-01  1.464          12m      monthly
## 143 2010-11-01  1.540          12m      monthly
```

```
## 144 2010-12-01  1.528         12m      monthly
## 145 2011-01-03  1.504         12m      monthly
## 146 2011-02-01  1.660         12m      monthly
## 147 2011-03-01  1.773         12m      monthly
## 148 2011-04-01  2.013         12m      monthly
## 149 2011-05-02  2.139         12m      monthly
## 150 2011-06-01  2.137         12m      monthly
## 151 2011-07-01  2.172         12m      monthly
## 152 2011-08-01  2.177         12m      monthly
## 153 2011-09-01  2.089         12m      monthly
## 154 2011-10-03  2.085         12m      monthly
## 155 2011-11-01  2.111         12m      monthly
## 156 2011-12-01  2.030         12m      monthly
## 157 2012-01-02  1.937         12m      monthly
## 158 2012-02-01  1.745         12m      monthly
## 159 2012-03-01  1.599         12m      monthly
## 160 2012-04-02  1.410         12m      monthly
## 161 2012-05-02  1.303         12m      monthly
## 162 2012-06-01  1.228         12m      monthly
## 163 2012-07-02  1.213         12m      monthly
## 164 2012-08-01  0.937         12m      monthly
## 165 2012-09-03  0.798         12m      monthly
## 166 2012-10-01  0.685         12m      monthly
## 167 2012-11-01  0.615         12m      monthly
## 168 2012-12-03  0.574         12m      monthly
## 169 2013-01-02  0.543         12m      monthly
## 170 2013-02-01  0.622         12m      monthly
## 171 2013-03-01  0.549         12m      monthly
## 172 2013-04-02  0.544         12m      monthly
## 173 2013-05-01  0.510         12m      monthly
## 174 2013-06-03  0.478         12m      monthly
## 175 2013-07-01  0.534         12m      monthly
## 176 2013-08-01  0.531         12m      monthly
## 177 2013-09-02  0.550         12m      monthly
## 178 2013-10-01  0.537         12m      monthly
## 179 2013-11-01  0.533         12m      monthly
## 180 2013-12-02  0.502         12m      monthly
## 181 2014-01-02  0.555         12m      monthly
## 182 2014-02-03  0.549         12m      monthly
## 183 2014-03-03  0.554         12m      monthly
## 184 2014-04-01  0.591         12m      monthly
## 185 2014-05-02  0.612         12m      monthly
## 186 2014-06-02  0.569         12m      monthly
## 187 2014-07-01  0.488         12m      monthly
## 188 2014-08-01  0.489         12m      monthly
## 189 2014-09-01  0.428         12m      monthly
## 190 2014-10-01  0.338         12m      monthly
## 191 2014-11-03  0.339         12m      monthly
## 192 2014-12-01  0.330         12m      monthly
## 193 2015-01-02  0.323         12m      monthly
## 194 2015-02-02  0.271         12m      monthly
## 195 2015-03-02  0.230         12m      monthly
## 196 2015-04-01  0.196         12m      monthly
## 197 2015-05-04  0.170         12m      monthly
```

```
## 198 2015-06-01  0.161                12m      monthly
## 199 2015-07-01  0.164                12m      monthly
## 200 2015-08-03  0.166                12m      monthly
## 201 2015-09-01  0.161                12m      monthly
## 202 2015-10-01  0.140                12m      monthly
## 203 2015-11-02  0.109                12m      monthly
## 204 2015-12-01  0.045                12m      monthly
## 205 2016-01-04  0.058                12m      monthly
## 206 2016-02-01  0.010                12m      monthly
## 207 2016-03-01 -0.026                12m      monthly
## 208 2016-04-01 -0.002                12m      monthly
## 209 2016-05-02 -0.012                12m      monthly
## 210 2016-06-01 -0.018                12m      monthly
## 211 2016-07-01 -0.052                12m      monthly
## 212 2016-08-01 -0.048                12m      monthly
## 213 2016-09-01 -0.051                12m      monthly
## 214 2016-10-03 -0.064                12m      monthly
## 215 2016-11-01 -0.069                12m      monthly
## 216 2016-12-01 -0.079                12m      monthly
## 217 2017-01-02 -0.083                12m      monthly
## 218 2017-02-01 -0.103                12m      monthly
## 219 2017-03-01 -0.114                12m      monthly
## 220 2017-04-03 -0.111                12m      monthly
```

```r
euribor.df <- as.data.frame(euribor)

# Remove columns maturity_level and granularity
euribor.df <- euribor.df[, setdiff(names(euribor.df), c("maturity_level", "granularity"))]
euribor.df
```

```
##           date   rate
## 1   1999-01-01  3.213
## 2   1999-02-01  2.998
## 3   1999-03-01  3.079
## 4   1999-04-01  2.939
## 5   1999-05-03  2.680
## 6   1999-06-01  2.735
## 7   1999-07-01  2.910
## 8   1999-08-02  3.188
## 9   1999-09-01  3.284
## 10  1999-10-01  3.401
## 11  1999-11-01  3.756
## 12  1999-12-01  3.763
## 13  2000-01-03  3.885
## 14  2000-02-01  4.079
## 15  2000-03-01  4.165
## 16  2000-04-03  4.304
## 17  2000-05-02  4.573
## 18  2000-06-01  4.983
## 19  2000-07-03  5.041
## 20  2000-08-01  5.164
## 21  2000-09-01  5.261
## 22  2000-10-02  5.173
## 23  2000-11-01  5.272
## 24  2000-12-01  5.054
```

```
## 25   2001-01-02   4.692
## 26   2001-02-01   4.505
## 27   2001-03-01   4.532
## 28   2001-04-02   4.314
## 29   2001-05-02   4.728
## 30   2001-06-01   4.396
## 31   2001-07-02   4.305
## 32   2001-08-01   4.215
## 33   2001-09-03   3.976
## 34   2001-10-01   3.493
## 35   2001-11-01   3.193
## 36   2001-12-03   3.183
## 37   2002-01-02   3.312
## 38   2002-02-01   3.633
## 39   2002-03-01   3.617
## 40   2002-04-02   3.994
## 41   2002-05-02   3.771
## 42   2002-06-03   3.999
## 43   2002-07-01   3.723
## 44   2002-08-01   3.479
## 45   2002-09-02   3.365
## 46   2002-10-01   3.062
## 47   2002-11-01   3.069
## 48   2002-12-02   3.010
## 49   2003-01-02   2.734
## 50   2003-02-03   2.658
## 51   2003-03-03   2.360
## 52   2003-04-01   2.373
## 53   2003-05-02   2.355
## 54   2003-06-02   2.151
## 55   2003-07-01   2.021
## 56   2003-08-01   2.232
## 57   2003-09-01   2.314
## 58   2003-10-01   2.117
## 59   2003-11-03   2.391
## 60   2003-12-01   2.503
## 61   2004-01-02   2.275
## 62   2004-02-02   2.251
## 63   2004-03-01   2.092
## 64   2004-04-01   1.978
## 65   2004-05-03   2.230
## 66   2004-06-01   2.332
## 67   2004-07-01   2.387
## 68   2004-08-02   2.353
## 69   2004-09-01   2.275
## 70   2004-10-01   2.372
## 71   2004-11-01   2.300
## 72   2004-12-01   2.278
## 73   2005-01-03   2.343
## 74   2005-02-01   2.288
## 75   2005-03-01   2.344
## 76   2005-04-01   2.335
## 77   2005-05-02   2.202
## 78   2005-06-01   2.140
```

```
## 79  2005-07-01  2.091
## 80  2005-08-01  2.221
## 81  2005-09-01  2.197
## 82  2005-10-03  2.334
## 83  2005-11-01  2.551
## 84  2005-12-01  2.756
## 85  2006-01-02  2.855
## 86  2006-02-01  2.900
## 87  2006-03-01  2.991
## 88  2006-04-03  3.254
## 89  2006-05-02  3.314
## 90  2006-06-01  3.369
## 91  2006-07-03  3.507
## 92  2006-08-01  3.542
## 93  2006-09-01  3.636
## 94  2006-10-02  3.748
## 95  2006-11-01  3.832
## 96  2006-12-01  3.851
## 97  2007-01-02  4.030
## 98  2007-02-01  4.080
## 99  2007-03-01  4.077
## 100 2007-04-02  4.193
## 101 2007-05-01  4.298
## 102 2007-06-01  4.466
## 103 2007-07-02  4.524
## 104 2007-08-01  4.522
## 105 2007-09-03  4.783
## 106 2007-10-01  4.716
## 107 2007-11-01  4.630
## 108 2007-12-03  4.711
## 109 2008-01-02  4.733
## 110 2008-02-01  4.330
## 111 2008-03-03  4.379
## 112 2008-04-01  4.735
## 113 2008-05-02  4.952
## 114 2008-06-02  5.097
## 115 2008-07-01  5.418
## 116 2008-08-01  5.357
## 117 2008-09-01  5.325
## 118 2008-10-01  5.505
## 119 2008-11-03  4.845
## 120 2008-12-01  3.921
## 121 2009-01-02  3.025
## 122 2009-02-02  2.259
## 123 2009-03-02  2.025
## 124 2009-04-01  1.801
## 125 2009-05-04  1.718
## 126 2009-06-01  1.626
## 127 2009-07-01  1.497
## 128 2009-08-03  1.346
## 129 2009-09-01  1.302
## 130 2009-10-01  1.237
## 131 2009-11-02  1.237
## 132 2009-12-01  1.236
```

```
## 133 2010-01-04  1.251
## 134 2010-02-01  1.226
## 135 2010-03-01  1.216
## 136 2010-04-01  1.214
## 137 2010-05-03  1.239
## 138 2010-06-01  1.262
## 139 2010-07-01  1.320
## 140 2010-08-02  1.418
## 141 2010-09-01  1.411
## 142 2010-10-01  1.464
## 143 2010-11-01  1.540
## 144 2010-12-01  1.528
## 145 2011-01-03  1.504
## 146 2011-02-01  1.660
## 147 2011-03-01  1.773
## 148 2011-04-01  2.013
## 149 2011-05-02  2.139
## 150 2011-06-01  2.137
## 151 2011-07-01  2.172
## 152 2011-08-01  2.177
## 153 2011-09-01  2.089
## 154 2011-10-03  2.085
## 155 2011-11-01  2.111
## 156 2011-12-01  2.030
## 157 2012-01-02  1.937
## 158 2012-02-01  1.745
## 159 2012-03-01  1.599
## 160 2012-04-02  1.410
## 161 2012-05-02  1.303
## 162 2012-06-01  1.228
## 163 2012-07-02  1.213
## 164 2012-08-01  0.937
## 165 2012-09-03  0.798
## 166 2012-10-01  0.685
## 167 2012-11-01  0.615
## 168 2012-12-03  0.574
## 169 2013-01-02  0.543
## 170 2013-02-01  0.622
## 171 2013-03-01  0.549
## 172 2013-04-02  0.544
## 173 2013-05-01  0.510
## 174 2013-06-03  0.478
## 175 2013-07-01  0.534
## 176 2013-08-01  0.531
## 177 2013-09-02  0.550
## 178 2013-10-01  0.537
## 179 2013-11-01  0.533
## 180 2013-12-02  0.502
## 181 2014-01-02  0.555
## 182 2014-02-03  0.549
## 183 2014-03-03  0.554
## 184 2014-04-01  0.591
## 185 2014-05-02  0.612
## 186 2014-06-02  0.569
```

```
## 187 2014-07-01  0.488
## 188 2014-08-01  0.489
## 189 2014-09-01  0.428
## 190 2014-10-01  0.338
## 191 2014-11-03  0.339
## 192 2014-12-01  0.330
## 193 2015-01-02  0.323
## 194 2015-02-02  0.271
## 195 2015-03-02  0.230
## 196 2015-04-01  0.196
## 197 2015-05-04  0.170
## 198 2015-06-01  0.161
## 199 2015-07-01  0.164
## 200 2015-08-03  0.166
## 201 2015-09-01  0.161
## 202 2015-10-01  0.140
## 203 2015-11-02  0.109
## 204 2015-12-01  0.045
## 205 2016-01-04  0.058
## 206 2016-02-01  0.010
## 207 2016-03-01 -0.026
## 208 2016-04-01 -0.002
## 209 2016-05-02 -0.012
## 210 2016-06-01 -0.018
## 211 2016-07-01 -0.052
## 212 2016-08-01 -0.048
## 213 2016-09-01 -0.051
## 214 2016-10-03 -0.064
## 215 2016-11-01 -0.069
## 216 2016-12-01 -0.079
## 217 2017-01-02 -0.083
## 218 2017-02-01 -0.103
## 219 2017-03-01 -0.114
## 220 2017-04-03 -0.111
```

```r
plot(euribor.df)

#install.packages("ggplot2")
#library(ggplot2)

#install.packages("prophet")
#library(prophet)

#install.packages("Rcpp")
#library("Rcpp")

#install.packages("forecast")
library(forecast)
```

```
## Warning: package 'forecast' was built under R version 3.4.2
```
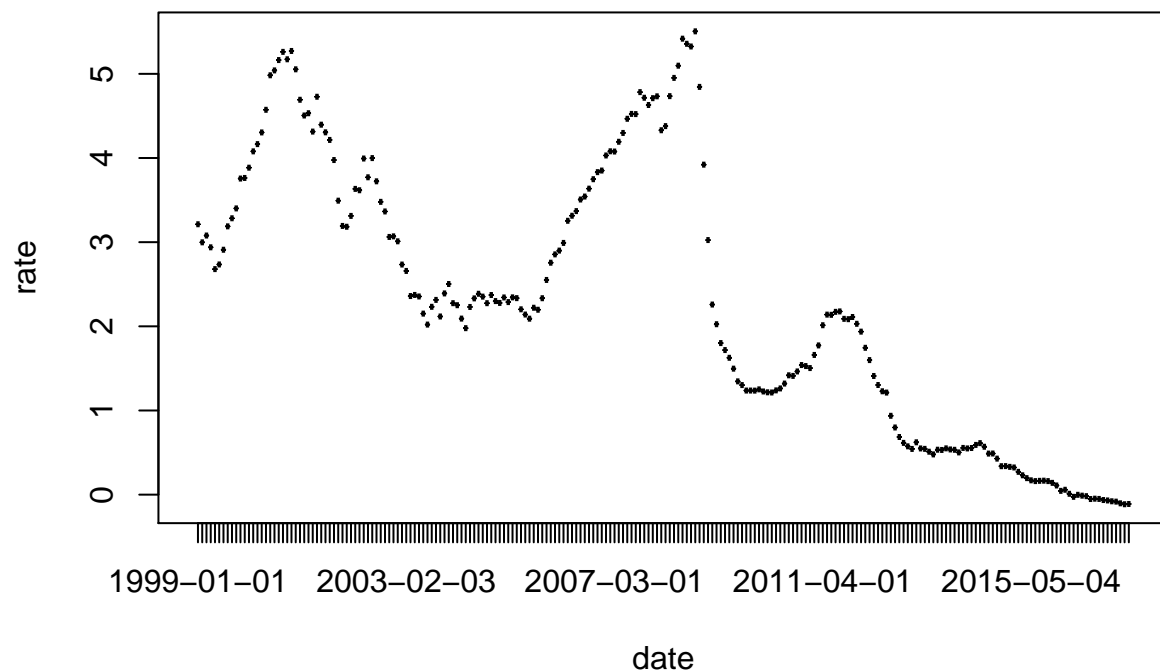
```
#https://research.fb.com/prophet-forecasting-at-scale/


# https://cran.r-project.org/web/packages/forecast/forecast.pdf


ts = ts(euribor.df)
ts
```

```
## Time Series:
## Start = 1
## End = 220
## Frequency = 1
##       date   rate
##   1     1   3.213
##   2     2   2.998
##   3     3   3.079
##   4     4   2.939
##   5     5   2.680
##   6     6   2.735
##   7     7   2.910
##   8     8   3.188
##   9     9   3.284
##  10    10   3.401
##  11    11   3.756
##  12    12   3.763
##  13    13   3.885
```
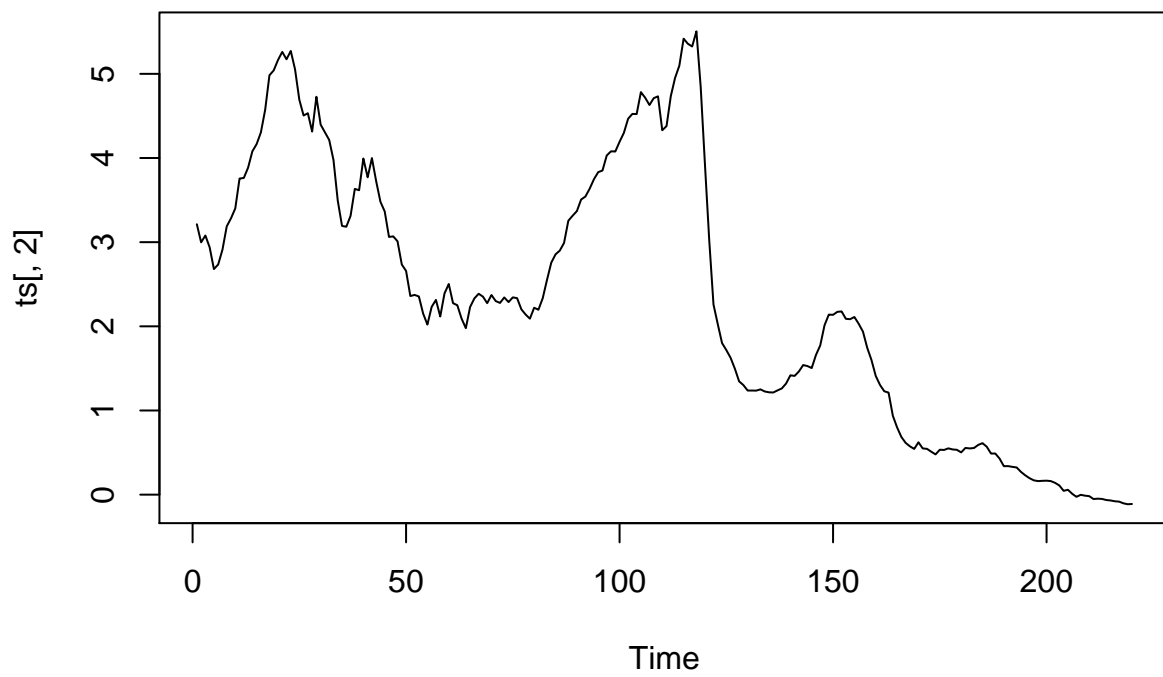
```
## 14   14   4.079
## 15   15   4.165
## 16   16   4.304
## 17   17   4.573
## 18   18   4.983
## 19   19   5.041
## 20   20   5.164
## 21   21   5.261
## 22   22   5.173
## 23   23   5.272
## 24   24   5.054
## 25   25   4.692
## 26   26   4.505
## 27   27   4.532
## 28   28   4.314
## 29   29   4.728
## 30   30   4.396
## 31   31   4.305
## 32   32   4.215
## 33   33   3.976
## 34   34   3.493
## 35   35   3.193
## 36   36   3.183
## 37   37   3.312
## 38   38   3.633
## 39   39   3.617
## 40   40   3.994
## 41   41   3.771
## 42   42   3.999
## 43   43   3.723
## 44   44   3.479
## 45   45   3.365
## 46   46   3.062
## 47   47   3.069
## 48   48   3.010
## 49   49   2.734
## 50   50   2.658
## 51   51   2.360
## 52   52   2.373
## 53   53   2.355
## 54   54   2.151
## 55   55   2.021
## 56   56   2.232
## 57   57   2.314
## 58   58   2.117
## 59   59   2.391
## 60   60   2.503
## 61   61   2.275
## 62   62   2.251
## 63   63   2.092
## 64   64   1.978
## 65   65   2.230
## 66   66   2.332
## 67   67   2.387
```

```
##  68  68  2.353
##  69  69  2.275
##  70  70  2.372
##  71  71  2.300
##  72  72  2.278
##  73  73  2.343
##  74  74  2.288
##  75  75  2.344
##  76  76  2.335
##  77  77  2.202
##  78  78  2.140
##  79  79  2.091
##  80  80  2.221
##  81  81  2.197
##  82  82  2.334
##  83  83  2.551
##  84  84  2.756
##  85  85  2.855
##  86  86  2.900
##  87  87  2.991
##  88  88  3.254
##  89  89  3.314
##  90  90  3.369
##  91  91  3.507
##  92  92  3.542
##  93  93  3.636
##  94  94  3.748
##  95  95  3.832
##  96  96  3.851
##  97  97  4.030
##  98  98  4.080
##  99  99  4.077
## 100 100  4.193
## 101 101  4.298
## 102 102  4.466
## 103 103  4.524
## 104 104  4.522
## 105 105  4.783
## 106 106  4.716
## 107 107  4.630
## 108 108  4.711
## 109 109  4.733
## 110 110  4.330
## 111 111  4.379
## 112 112  4.735
## 113 113  4.952
## 114 114  5.097
## 115 115  5.418
## 116 116  5.357
## 117 117  5.325
## 118 118  5.505
## 119 119  4.845
## 120 120  3.921
## 121 121  3.025
```

```
## 122  122  2.259
## 123  123  2.025
## 124  124  1.801
## 125  125  1.718
## 126  126  1.626
## 127  127  1.497
## 128  128  1.346
## 129  129  1.302
## 130  130  1.237
## 131  131  1.237
## 132  132  1.236
## 133  133  1.251
## 134  134  1.226
## 135  135  1.216
## 136  136  1.214
## 137  137  1.239
## 138  138  1.262
## 139  139  1.320
## 140  140  1.418
## 141  141  1.411
## 142  142  1.464
## 143  143  1.540
## 144  144  1.528
## 145  145  1.504
## 146  146  1.660
## 147  147  1.773
## 148  148  2.013
## 149  149  2.139
## 150  150  2.137
## 151  151  2.172
## 152  152  2.177
## 153  153  2.089
## 154  154  2.085
## 155  155  2.111
## 156  156  2.030
## 157  157  1.937
## 158  158  1.745
## 159  159  1.599
## 160  160  1.410
## 161  161  1.303
## 162  162  1.228
## 163  163  1.213
## 164  164  0.937
## 165  165  0.798
## 166  166  0.685
## 167  167  0.615
## 168  168  0.574
## 169  169  0.543
## 170  170  0.622
## 171  171  0.549
## 172  172  0.544
## 173  173  0.510
## 174  174  0.478
## 175  175  0.534
```

```
## 176  176  0.531
## 177  177  0.550
## 178  178  0.537
## 179  179  0.533
## 180  180  0.502
## 181  181  0.555
## 182  182  0.549
## 183  183  0.554
## 184  184  0.591
## 185  185  0.612
## 186  186  0.569
## 187  187  0.488
## 188  188  0.489
## 189  189  0.428
## 190  190  0.338
## 191  191  0.339
## 192  192  0.330
## 193  193  0.323
## 194  194  0.271
## 195  195  0.230
## 196  196  0.196
## 197  197  0.170
## 198  198  0.161
## 199  199  0.164
## 200  200  0.166
## 201  201  0.161
## 202  202  0.140
## 203  203  0.109
## 204  204  0.045
## 205  205  0.058
## 206  206  0.010
## 207  207 -0.026
## 208  208 -0.002
## 209  209 -0.012
## 210  210 -0.018
## 211  211 -0.052
## 212  212 -0.048
## 213  213 -0.051
## 214  214 -0.064
## 215  215 -0.069
## 216  216 -0.079
## 217  217 -0.083
## 218  218 -0.103
## 219  219 -0.114
## 220  220 -0.111
```

```r
plot(ts[,2])
```

```r
plot(ts[,2],type="o",col="blue")
```

ts[,1]

```
## Time Series:
## Start = 1
## End = 220
## Frequency = 1
##   [1]    1    2    3    4    5    6    7    8    9   10   11   12   13   14   15   16   17
##  [18]   18   19   20   21   22   23   24   25   26   27   28   29   30   31   32   33   34
##  [35]   35   36   37   38   39   40   41   42   43   44   45   46   47   48   49   50   51
##  [52]   52   53   54   55   56   57   58   59   60   61   62   63   64   65   66   67   68
##  [69]   69   70   71   72   73   74   75   76   77   78   79   80   81   82   83   84   85
##  [86]   86   87   88   89   90   91   92   93   94   95   96   97   98   99  100  101  102
## [103]  103  104  105  106  107  108  109  110  111  112  113  114  115  116  117  118  119
## [120]  120  121  122  123  124  125  126  127  128  129  130  131  132  133  134  135  136
## [137]  137  138  139  140  141  142  143  144  145  146  147  148  149  150  151  152  153
## [154]  154  155  156  157  158  159  160  161  162  163  164  165  166  167  168  169  170
## [171]  171  172  173  174  175  176  177  178  179  180  181  182  183  184  185  186  187
## [188]  188  189  190  191  192  193  194  195  196  197  198  199  200  201  202  203  204
## [205]  205  206  207  208  209  210  211  212  213  214  215  216  217  218  219  220
```

ts[,2]

```
## Time Series:
## Start = 1
## End = 220
## Frequency = 1
##   [1]  3.213  2.998  3.079  2.939  2.680  2.735  2.910  3.188  3.284  3.401
```

```
## [11]   3.756   3.763   3.885   4.079   4.165   4.304   4.573   4.983   5.041   5.164
## [21]   5.261   5.173   5.272   5.054   4.692   4.505   4.532   4.314   4.728   4.396
## [31]   4.305   4.215   3.976   3.493   3.193   3.183   3.312   3.633   3.617   3.994
## [41]   3.771   3.999   3.723   3.479   3.365   3.062   3.069   3.010   2.734   2.658
## [51]   2.360   2.373   2.355   2.151   2.021   2.232   2.314   2.117   2.391   2.503
## [61]   2.275   2.251   2.092   1.978   2.230   2.332   2.387   2.353   2.275   2.372
## [71]   2.300   2.278   2.343   2.288   2.344   2.335   2.202   2.140   2.091   2.221
## [81]   2.197   2.334   2.551   2.756   2.855   2.900   2.991   3.254   3.314   3.369
## [91]   3.507   3.542   3.636   3.748   3.832   3.851   4.030   4.080   4.077   4.193
## [101]   4.298   4.466   4.524   4.522   4.783   4.716   4.630   4.711   4.733   4.330
## [111]   4.379   4.735   4.952   5.097   5.418   5.357   5.325   5.505   4.845   3.921
## [121]   3.025   2.259   2.025   1.801   1.718   1.626   1.497   1.346   1.302   1.237
## [131]   1.237   1.236   1.251   1.226   1.216   1.214   1.239   1.262   1.320   1.418
## [141]   1.411   1.464   1.540   1.528   1.504   1.660   1.773   2.013   2.139   2.137
## [151]   2.172   2.177   2.089   2.085   2.111   2.030   1.937   1.745   1.599   1.410
## [161]   1.303   1.228   1.213   0.937   0.798   0.685   0.615   0.574   0.543   0.622
## [171]   0.549   0.544   0.510   0.478   0.534   0.531   0.550   0.537   0.533   0.502
## [181]   0.555   0.549   0.554   0.591   0.612   0.569   0.488   0.489   0.428   0.338
## [191]   0.339   0.330   0.323   0.271   0.230   0.196   0.170   0.161   0.164   0.166
## [201]   0.161   0.140   0.109   0.045   0.058   0.010 -0.026 -0.002 -0.012 -0.018
## [211] -0.052 -0.048 -0.051 -0.064 -0.069 -0.079 -0.083 -0.103 -0.114 -0.111
```

ts

```
## Time Series:
## Start = 1
## End = 220
## Frequency = 1
##      date   rate
## 1      1   3.213
## 2      2   2.998
## 3      3   3.079
## 4      4   2.939
## 5      5   2.680
## 6      6   2.735
## 7      7   2.910
## 8      8   3.188
## 9      9   3.284
## 10    10   3.401
## 11    11   3.756
## 12    12   3.763
## 13    13   3.885
## 14    14   4.079
## 15    15   4.165
## 16    16   4.304
## 17    17   4.573
## 18    18   4.983
## 19    19   5.041
## 20    20   5.164
## 21    21   5.261
## 22    22   5.173
## 23    23   5.272
## 24    24   5.054
## 25    25   4.692
## 26    26   4.505
```

```
## 27   27   4.532
## 28   28   4.314
## 29   29   4.728
## 30   30   4.396
## 31   31   4.305
## 32   32   4.215
## 33   33   3.976
## 34   34   3.493
## 35   35   3.193
## 36   36   3.183
## 37   37   3.312
## 38   38   3.633
## 39   39   3.617
## 40   40   3.994
## 41   41   3.771
## 42   42   3.999
## 43   43   3.723
## 44   44   3.479
## 45   45   3.365
## 46   46   3.062
## 47   47   3.069
## 48   48   3.010
## 49   49   2.734
## 50   50   2.658
## 51   51   2.360
## 52   52   2.373
## 53   53   2.355
## 54   54   2.151
## 55   55   2.021
## 56   56   2.232
## 57   57   2.314
## 58   58   2.117
## 59   59   2.391
## 60   60   2.503
## 61   61   2.275
## 62   62   2.251
## 63   63   2.092
## 64   64   1.978
## 65   65   2.230
## 66   66   2.332
## 67   67   2.387
## 68   68   2.353
## 69   69   2.275
## 70   70   2.372
## 71   71   2.300
## 72   72   2.278
## 73   73   2.343
## 74   74   2.288
## 75   75   2.344
## 76   76   2.335
## 77   77   2.202
## 78   78   2.140
## 79   79   2.091
## 80   80   2.221
```

```
##  81   81  2.197
##  82   82  2.334
##  83   83  2.551
##  84   84  2.756
##  85   85  2.855
##  86   86  2.900
##  87   87  2.991
##  88   88  3.254
##  89   89  3.314
##  90   90  3.369
##  91   91  3.507
##  92   92  3.542
##  93   93  3.636
##  94   94  3.748
##  95   95  3.832
##  96   96  3.851
##  97   97  4.030
##  98   98  4.080
##  99   99  4.077
## 100  100  4.193
## 101  101  4.298
## 102  102  4.466
## 103  103  4.524
## 104  104  4.522
## 105  105  4.783
## 106  106  4.716
## 107  107  4.630
## 108  108  4.711
## 109  109  4.733
## 110  110  4.330
## 111  111  4.379
## 112  112  4.735
## 113  113  4.952
## 114  114  5.097
## 115  115  5.418
## 116  116  5.357
## 117  117  5.325
## 118  118  5.505
## 119  119  4.845
## 120  120  3.921
## 121  121  3.025
## 122  122  2.259
## 123  123  2.025
## 124  124  1.801
## 125  125  1.718
## 126  126  1.626
## 127  127  1.497
## 128  128  1.346
## 129  129  1.302
## 130  130  1.237
## 131  131  1.237
## 132  132  1.236
## 133  133  1.251
## 134  134  1.226
```

```
## 135  135  1.216
## 136  136  1.214
## 137  137  1.239
## 138  138  1.262
## 139  139  1.320
## 140  140  1.418
## 141  141  1.411
## 142  142  1.464
## 143  143  1.540
## 144  144  1.528
## 145  145  1.504
## 146  146  1.660
## 147  147  1.773
## 148  148  2.013
## 149  149  2.139
## 150  150  2.137
## 151  151  2.172
## 152  152  2.177
## 153  153  2.089
## 154  154  2.085
## 155  155  2.111
## 156  156  2.030
## 157  157  1.937
## 158  158  1.745
## 159  159  1.599
## 160  160  1.410
## 161  161  1.303
## 162  162  1.228
## 163  163  1.213
## 164  164  0.937
## 165  165  0.798
## 166  166  0.685
## 167  167  0.615
## 168  168  0.574
## 169  169  0.543
## 170  170  0.622
## 171  171  0.549
## 172  172  0.544
## 173  173  0.510
## 174  174  0.478
## 175  175  0.534
## 176  176  0.531
## 177  177  0.550
## 178  178  0.537
## 179  179  0.533
## 180  180  0.502
## 181  181  0.555
## 182  182  0.549
## 183  183  0.554
## 184  184  0.591
## 185  185  0.612
## 186  186  0.569
## 187  187  0.488
## 188  188  0.489
```

```
## 189  189   0.428
## 190  190   0.338
## 191  191   0.339
## 192  192   0.330
## 193  193   0.323
## 194  194   0.271
## 195  195   0.230
## 196  196   0.196
## 197  197   0.170
## 198  198   0.161
## 199  199   0.164
## 200  200   0.166
## 201  201   0.161
## 202  202   0.140
## 203  203   0.109
## 204  204   0.045
## 205  205   0.058
## 206  206   0.010
## 207  207  -0.026
## 208  208  -0.002
## 209  209  -0.012
## 210  210  -0.018
## 211  211  -0.052
## 212  212  -0.048
## 213  213  -0.051
## 214  214  -0.064
## 215  215  -0.069
## 216  216  -0.079
## 217  217  -0.083
## 218  218  -0.103
## 219  219  -0.114
## 220  220  -0.111
```

```r
# Predict using Auto Arima
fit <- auto.arima(ts[,2])
plot(forecast(fit,h=20))
```

Forecasts from ARIMA(0,1,3)
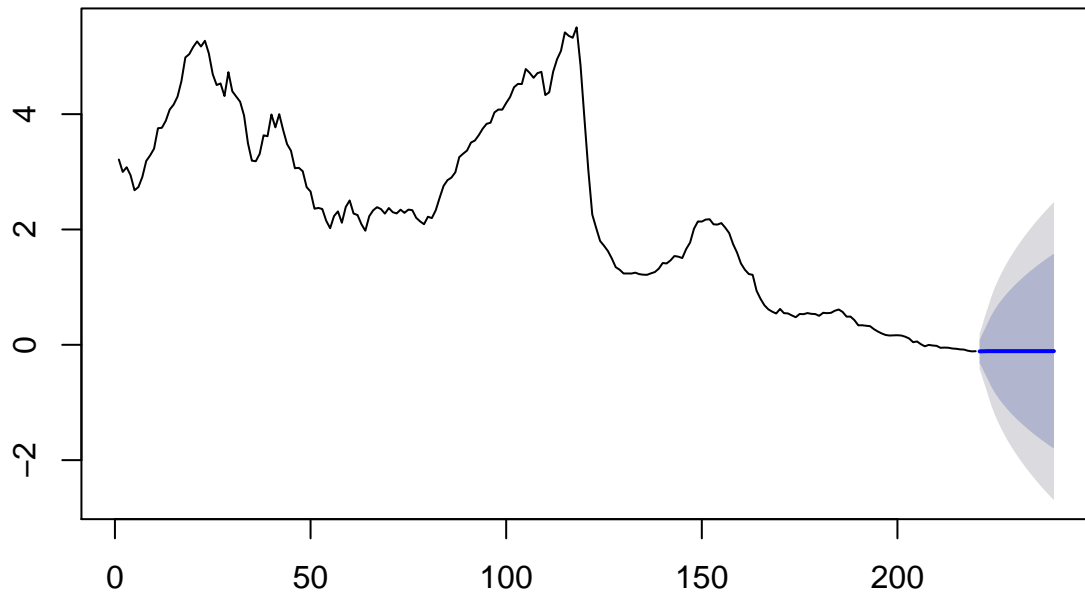

```
# 30 years x 12 months = 360 months
# Predict using Auto Arima for 120 months
fit <- auto.arima(ts[,2])
plot(forecast(fit,h=360))
```

Forecasts from ARIMA(0,1,3)
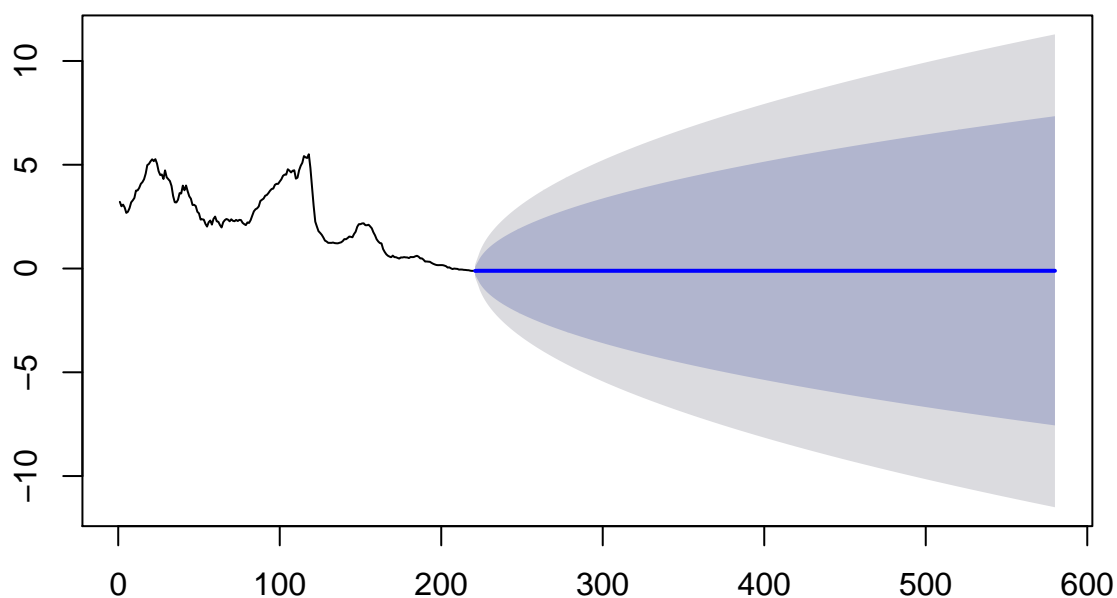

```
fit
```

```
## Series: ts[, 2]
## ARIMA(0,1,3)
##
## Coefficients:
##          ma1    ma2     ma3
##       0.3728  0.322  0.2859
## s.e.  0.0655  0.068  0.0593
##
## sigma^2 estimated as 0.02403:  log likelihood=98.83
## AIC=-189.67   AICc=-189.48   BIC=-176.11
```

```
fit$residuals
```

```
## Time Series:
## Start = 1
## End = 220
## Frequency = 1
##    [1]  0.0032129979 -0.1868219060  0.1704148167 -0.1331626203 -0.2088935729
##    [6]  0.1287880523  0.2300258515  0.2088792940 -0.0923584786  0.0187033681
##   [11]  0.3180785863 -0.0912342797  0.0482570448  0.1144432770  0.0538761554
##   [16]  0.0682668015  0.1934793448  0.3004791435 -0.1358455714  0.0215776296
##   [21]  0.0467845254 -0.0735502767  0.1051884280 -0.2469116522 -0.2827836809
##   [26] -0.0321406617  0.2006326203 -0.2016012774  0.4337513359 -0.4861671137
##   [31]  0.0082362834 -0.0605457478 -0.0800758697 -0.4360047879 -0.0943483474
##   [36]  0.1884605278  0.2137754456  0.2075905794 -0.2161140812  0.3296105844
```

```
## [41]  -0.3356563967   0.3088026766  -0.3772944274  -0.1067943461  -0.0409897469
## [46]  -0.1454566007   0.1049634968  -0.0395786167  -0.2534527483   0.0012288314
## [51]  -0.2055326263   0.1616997445  -0.0124587990  -0.1926557864  -0.1003923814
## [56]   0.3140251053   0.0523297034  -0.2889196267   0.2750845101   0.0875069044
## [61]  -0.2665935013  -0.0314324174  -0.0864599442   0.0045792641   0.2871189953
## [66]   0.0181982864  -0.0455438044  -0.1049711875  -0.0294017635   0.1547833556
## [71]  -0.0902283874  -0.0297922281   0.0609052667  -0.0423169964   0.0606843152
## [76]  -0.0354132044  -0.1272374783  -0.0205095215   0.0097410734   0.1693512347
## [81]  -0.0844122910   0.1111570786   0.1543167901   0.1358088414  -0.0331041005
## [86]  -0.0305084074   0.0742039087   0.2546227179  -0.0501019096  -0.0295224966
## [91]   0.0923387422   0.0244039336   0.0636101420   0.0540251272   0.0363983196
## [96]  -0.0301531987   0.1630755790  -0.0114977704  -0.0426007788   0.0889593303
## [101]   0.0888374544   0.1184146138  -0.0401885518  -0.0505447608   0.2589285286
## [106]  -0.1357716651  -0.1043008375   0.0895723355   0.0610075639  -0.4247658652
## [111]   0.1621128046   0.4148865645   0.1315648794  -0.0839918398   0.1913298242
## [116]  -0.1429059427  -0.0163117639   0.1773917785  -0.6800262801  -0.7229183814
## [121]  -0.4582291182  -0.1679541385   0.1828578166  -0.1070810314  -0.0539344542
## [126]  -0.0896942419  -0.0475765153  -0.0889605110   0.0301315781  -0.0339867477
## [131]   0.0284044839  -0.0092618037   0.0190244675  -0.0372320181   0.0004037229
## [136]   0.0043984475   0.0338753265   0.0088384679   0.0425396082   0.0696084446
## [141]  -0.0491767377   0.0367587253   0.0582274465  -0.0314846932  -0.0415200373
## [146]   0.1649696924   0.0738648563   0.1712132762  -0.0087851410  -0.0749727646
## [151]   0.0168285441   0.0253780895  -0.0814445539   0.0133821807   0.0399790682
## [156]  -0.0769282013  -0.0810176735  -0.1484544091  -0.0425693989  -0.1021636020
## [161]  -0.0127576785  -0.0251765546   0.0277046543  -0.2745749828  -0.0383516287
## [166]  -0.0182118860   0.0276440781  -0.0344772503  -0.0218398122   0.0903400848
## [171]  -0.0897919836   0.0056331107  -0.0330176651   0.0041691832   0.0634663729
## [176]  -0.0185645424   0.0042938709  -0.0267693052   0.0099057863  -0.0273014261
## [181]   0.0676430632  -0.0252609894   0.0004436058   0.0256282134   0.0185246233
## [186]  -0.0582854686  -0.0725615028   0.0415242238  -0.0364527736  -0.0690331535
## [191]   0.0266028767   0.0137319992  -0.0009479749  -0.0636743101  -0.0208810609
## [196]  -0.0054412835   0.0009576620  -0.0016347889   0.0048568922   0.0004417660
## [201]  -0.0062611670  -0.0201965346  -0.0215803346  -0.0476608798   0.0434927178
## [206]  -0.0426990222  -0.0204576539   0.0329407326  -0.0034859156  -0.0094577806
## [211]  -0.0387696581   0.0224966047   0.0038001093  -0.0105756571  -0.0087127705
## [216]  -0.0044328392   0.0034818823  -0.0173797132  -0.0043739836   0.0092313452
```

```
fit$fitted
```

```
## Time Series:
## Start = 1
## End = 220
## Frequency = 1
##   [1]   3.209787002   3.184821906   2.908585183   3.072162620   2.888893573
##   [6]   2.606211948   2.679974149   2.979120706   3.376358479   3.382296632
##  [11]   3.437921414   3.854234280   3.836742955   3.964556723   4.111123845
##  [16]   4.235733199   4.379520655   4.682520857   5.176845571   5.142422370
##  [21]   5.214215475   5.246550277   5.166811572   5.300911652   4.974783681
##  [26]   4.537140662   4.331367380   4.515601277   4.294248664   4.882167114
##  [31]   4.296763717   4.275545748   4.056075870   3.929004788   3.287348347
##  [36]   2.994539472   3.098224554   3.425409421   3.833114081   3.664389416
##  [41]   4.106656397   3.690197323   4.100294427   3.585794346   3.405989747
##  [46]   3.207456601   2.964036503   3.049578617   2.987452748   2.656771169
##  [51]   2.565532626   2.211300255   2.367458799   2.343655786   2.121392381
##  [56]   1.917974895   2.261670297   2.405919627   2.115915490   2.415493096
```

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```
## [61]    2.541593501  2.282432417  2.178459944  1.973420736  1.942881005
## [66]    2.313801714  2.432543804  2.457971187  2.304401763  2.217216644
## [71]    2.390228387  2.307792228  2.282094733  2.330316996  2.283315685
## [76]    2.370413204  2.329237478  2.160509521  2.081258927  2.051648765
## [81]    2.281412291  2.222842921  2.396683210  2.620191159  2.888104101
## [86]    2.930508407  2.916796091  2.999377282  3.364101910  3.398522497
## [91]    3.414661258  3.517596066  3.572389858  3.693974873  3.795601680
## [96]    3.881153199  3.866924421  4.091497770  4.119600779  4.104040670
## [101]   4.209162546  4.347585386  4.564188552  4.572544761  4.524071471
## [106]   4.851771665  4.734300837  4.621427664  4.671992436  4.754765865
## [111]   4.216887195  4.320113435  4.820435121  5.180991840  5.226670176
## [116]   5.499905943  5.341311764  5.327608222  5.525026280  4.643918381
## [121]   3.483229118  2.426954138  1.842142183  1.908081031  1.771934454
## [126]   1.715694242  1.544576515  1.434960511  1.271868422  1.270986748
## [131]   1.208595516  1.245261804  1.231975533  1.263232018  1.215596277
## [136]   1.209601553  1.205124673  1.253161532  1.277460392  1.348391555
## [141]   1.460176738  1.427241275  1.481772553  1.559484693  1.545520037
## [146]   1.495030308  1.699135144  1.841786724  2.147785141  2.211972765
## [151]   2.155171456  2.151621910  2.170444554  2.071617819  2.071020932
## [156]   2.106928201  2.018017674  1.893454409  1.641569399  1.512163602
## [161]   1.315757679  1.253176555  1.185295346  1.211574983  0.836351629
## [166]   0.703211886  0.587355922  0.608477250  0.564839812  0.531659915
## [171]   0.638791984  0.538366889  0.543017665  0.473830817  0.470533627
## [176]   0.549564542  0.545706129  0.563769305  0.523094214  0.529301426
## [181]   0.487356937  0.574260989  0.553556394  0.565371787  0.593475377
## [186]   0.627285469  0.560561503  0.447475776  0.464452774  0.407033153
## [191]   0.312397123  0.316268001  0.323947975  0.334674310  0.250881061
## [196]   0.201441284  0.169042338  0.162634789  0.159143108  0.165558234
## [201]   0.167261167  0.160196535  0.130580335  0.092660880  0.014507282
## [206]   0.052699022 -0.005542346 -0.034940733 -0.008514084 -0.008542219
## [211]  -0.013230342 -0.070496605 -0.054800109 -0.053424343 -0.060287230
## [216]  -0.074567161 -0.086481882 -0.085620287 -0.109626016 -0.120231345
```

```
fit$x
```

```
## Time Series:
## Start = 1
## End = 220
## Frequency = 1
##   [1]  3.213  2.998  3.079  2.939  2.680  2.735  2.910  3.188  3.284  3.401
##  [11]  3.756  3.763  3.885  4.079  4.165  4.304  4.573  4.983  5.041  5.164
##  [21]  5.261  5.173  5.272  5.054  4.692  4.505  4.532  4.314  4.728  4.396
##  [31]  4.305  4.215  3.976  3.493  3.193  3.183  3.312  3.633  3.617  3.994
##  [41]  3.771  3.999  3.723  3.479  3.365  3.062  3.069  3.010  2.734  2.658
##  [51]  2.360  2.373  2.355  2.151  2.021  2.232  2.314  2.117  2.391  2.503
##  [61]  2.275  2.251  2.092  1.978  2.230  2.332  2.387  2.353  2.275  2.372
##  [71]  2.300  2.278  2.343  2.288  2.344  2.335  2.202  2.140  2.091  2.221
##  [81]  2.197  2.334  2.551  2.756  2.855  2.900  2.991  3.254  3.314  3.369
##  [91]  3.507  3.542  3.636  3.748  3.832  3.851  4.030  4.080  4.077  4.193
## [101]  4.298  4.466  4.524  4.522  4.783  4.716  4.630  4.711  4.733  4.330
## [111]  4.379  4.735  4.952  5.097  5.418  5.357  5.325  5.505  4.845  3.921
## [121]  3.025  2.259  2.025  1.801  1.718  1.626  1.497  1.346  1.302  1.237
## [131]  1.237  1.236  1.251  1.226  1.216  1.214  1.239  1.262  1.320  1.418
## [141]  1.411  1.464  1.540  1.528  1.504  1.660  1.773  2.013  2.139  2.137
## [151]  2.172  2.177  2.089  2.085  2.111  2.030  1.937  1.745  1.599  1.410
```

```
## [161]   1.303   1.228   1.213   0.937   0.798   0.685   0.615   0.574   0.543   0.622
## [171]   0.549   0.544   0.510   0.478   0.534   0.531   0.550   0.537   0.533   0.502
## [181]   0.555   0.549   0.554   0.591   0.612   0.569   0.488   0.489   0.428   0.338
## [191]   0.339   0.330   0.323   0.271   0.230   0.196   0.170   0.161   0.164   0.166
## [201]   0.161   0.140   0.109   0.045   0.058   0.010  -0.026  -0.002  -0.012  -0.018
## [211]  -0.052  -0.048  -0.051  -0.064  -0.069  -0.079  -0.083  -0.103  -0.114  -0.111
```

```r
# Predict using Auto Arima for 120 months
fit <- auto.arima(ts[,2])
plot(forecast(fit,h=120))
```


Forecasts from ARIMA(0,1,3)
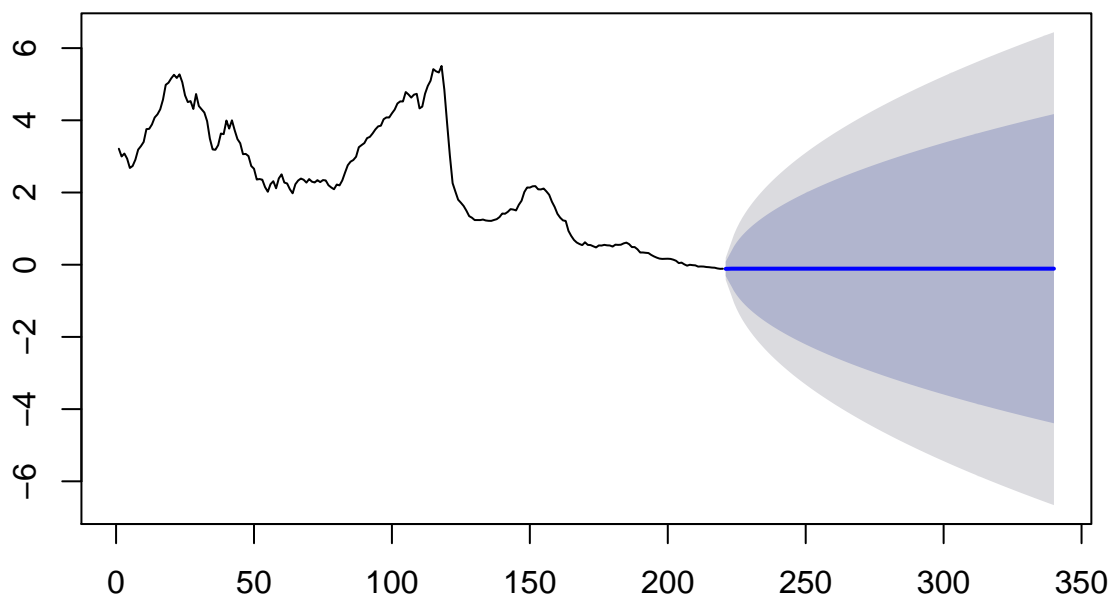
```r
# Predict using Auto Arima for 3 months
fit <- auto.arima(ts[,2])
plot(forecast(fit,h=3))
```
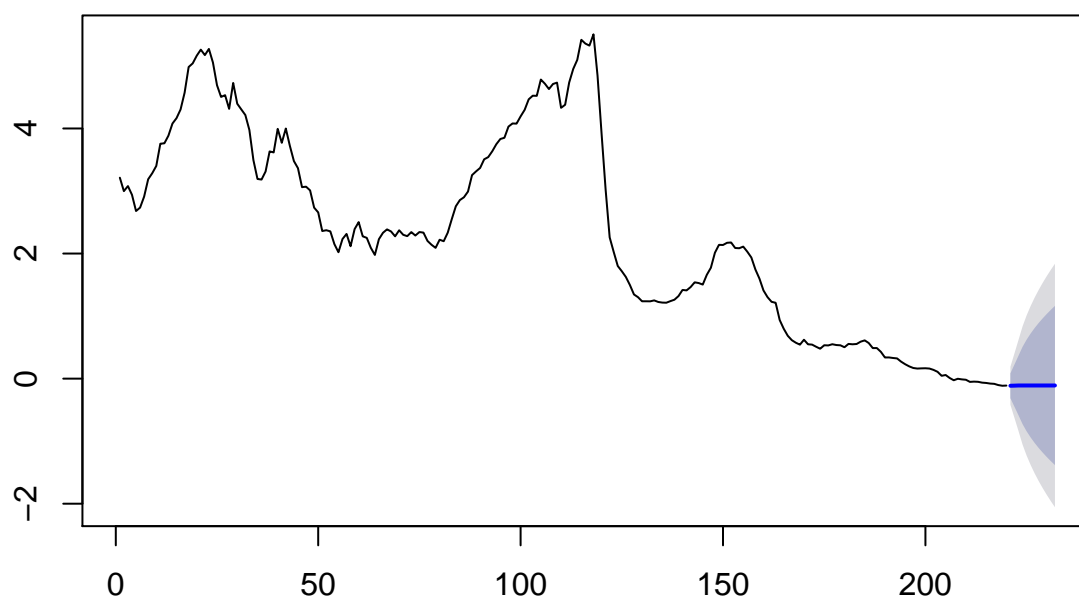
Forecasts from ARIMA(0,1,3)
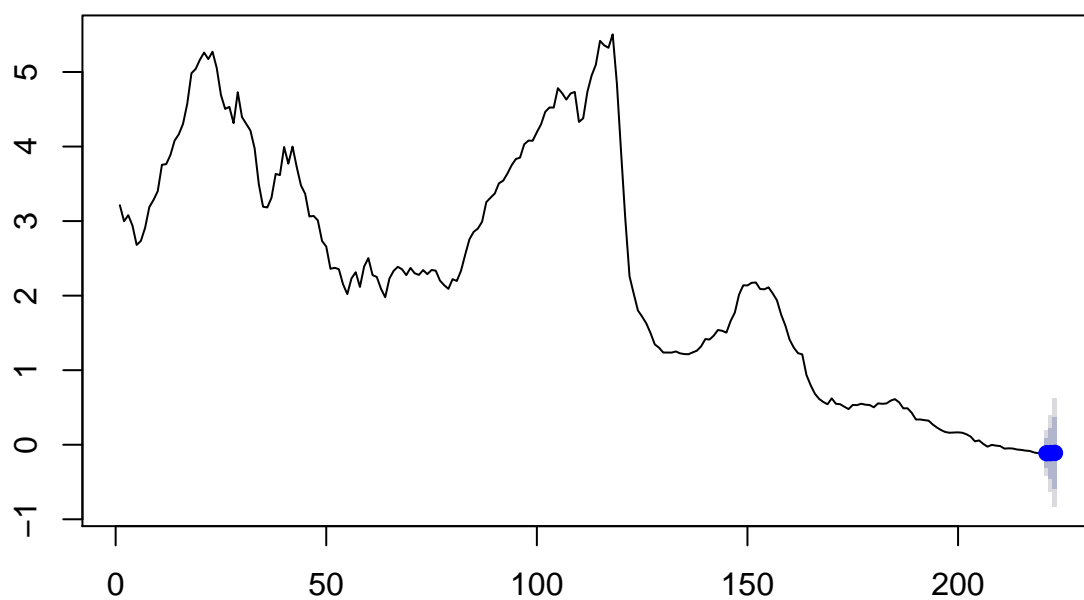

```r
# Predict using Auto Arima for 48 months
fit <- auto.arima(ts[,2])
plot(forecast(fit,h=48))
```

Forecasts from ARIMA(0,1,3)
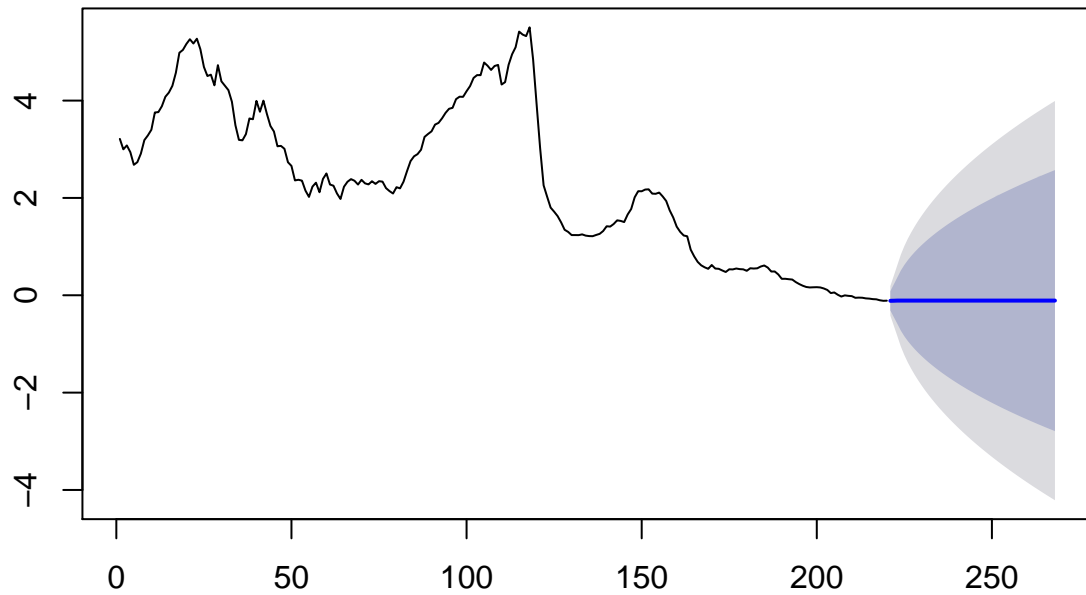

```
# Predict using Auto Arima for 12 months
fit <- auto.arima(ts[,2])
plot(forecast(fit,h=12))
```
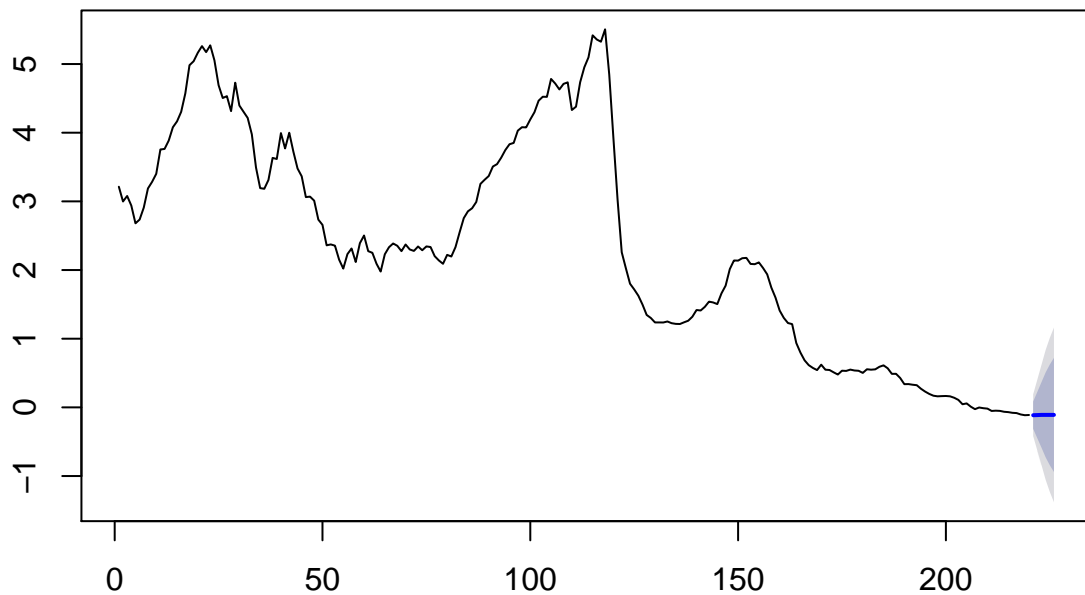
Forecasts from ARIMA(0,1,3)


```r
# Predict using Auto Arima for 6 months
fit <- auto.arima(ts[,2])
plot(forecast(fit,h=6))

# Predict using Auto Arima for 6 months
fit <- auto.arima(ts[,2])
plot(forecast(fit,h=6))
```

Forecasts from ARIMA(0,1,3)

If you want to contribute to improve it, please contact me.

Questions:

How is it possible to predict Euribor for 20 to 40 years?

What is the magic?