



Unemployment
Trends

Group 4

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Initial Plots

Differencing
ACF & PACF

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Seasonal Models
Seasonally
Adjusted Models

US Unemployment Trends

Initial Model Selection

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STAT 626: Time Series Analysis



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Second differences with and without seasonal adjustments

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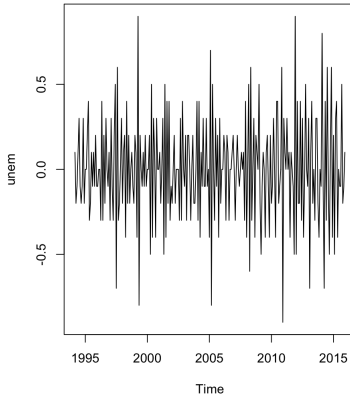
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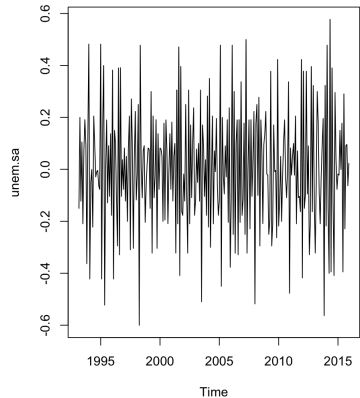
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Seasonal Data
 $\text{diff}(\text{diff}(\text{unem}, \text{differences} = 2), \text{lag} = 12)$



Seasonally Adjusted Data
 $\text{diff}(\text{unem.sa}, \text{differences} = 2)$





ACF & PACF Plots

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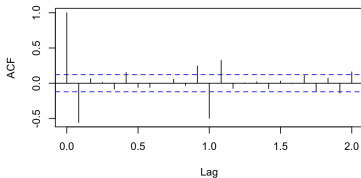
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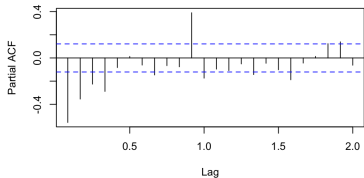
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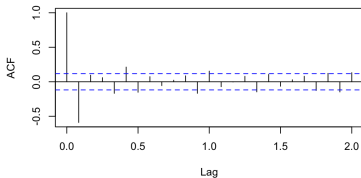
Series unem



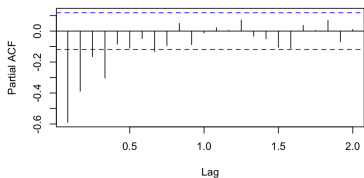
Series unem



Series unem.sa



Series unem.sa





Models Considered

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Table: Model Summaries

#	Data	Order	Seasonal Order	XRegs	AIC	BIC
1	Unem	0,2,1	1,1,0	N	-2.27	-3.23
2	Unem	0,2,1	3,1,0	N	-2.44	-3.37
3	Unem	4,2,1	3,1,0	N	-2.44	-3.32
4	Unem.sa	0,2,1	1,0,0	N	-2.61	-3.58
5	Unem.sa	1,2,1		N	-2.63	-3.60
6	Unem.sa	0,2,1	1,0,0	Y	-2.58	-3.49
7	Unem.sa	1,2,1		Y	-2.60	-3.49



Model 1: SARIMA(0, 2, 1) \times (1, 1, 0)₁₂

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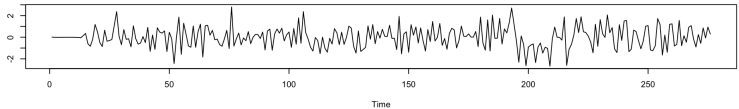
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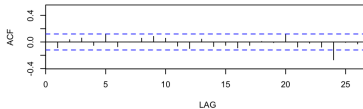
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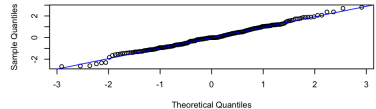
Standardized Residuals



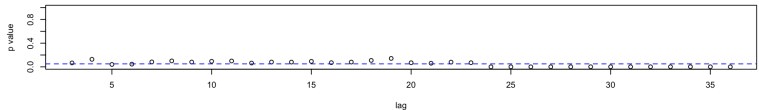
ACF of Residuals



Normal Q-Q Plot of Std Residuals



p values for Ljung-Box statistic





Model 2: $\text{SARIMA}(0, 2, 1) \times (3, 1, 0)_{12}$

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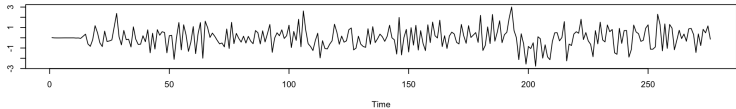
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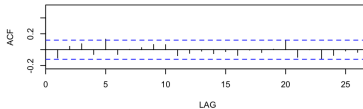
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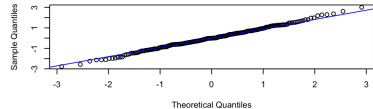
Standardized Residuals



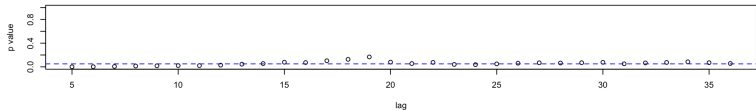
ACF of Residuals



Normal Q-Q Plot of Std Residuals



p values for Ljung-Box statistic





Model 3: SARIMA(4, 2, 1) \times (3, 1, 0)₁₂

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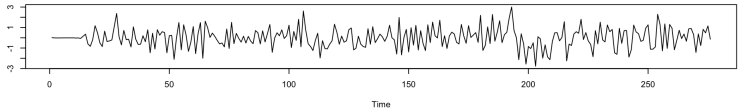
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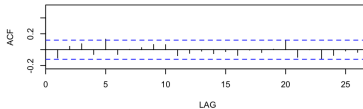
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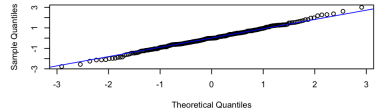
Standardized Residuals



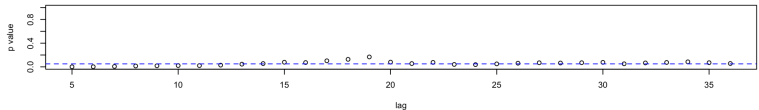
ACF of Residuals



Normal Q-Q Plot of Std Residuals



p values for Ljung-Box statistic





Model 4: SARIMA(0, 2, 1) \times (1, 0, 0)₁₂

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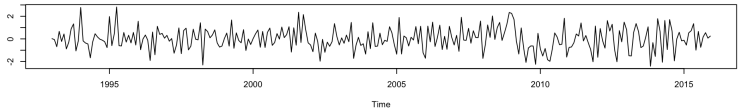
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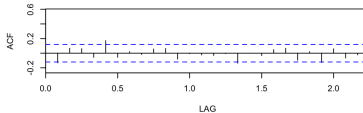
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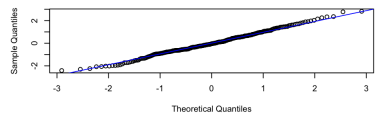
Standardized Residuals



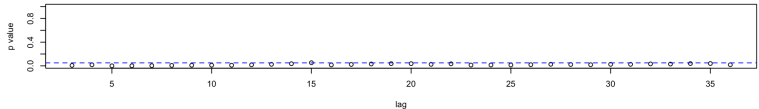
ACF of Residuals



Normal Q-Q Plot of Std Residuals



p values for Ljung-Box statistic





Model 5: ARIMA(1, 2, 1)

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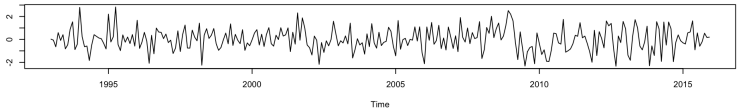
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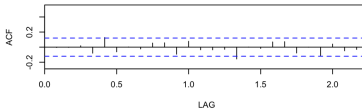
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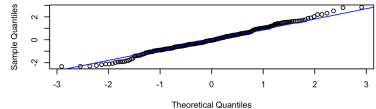
Standardized Residuals



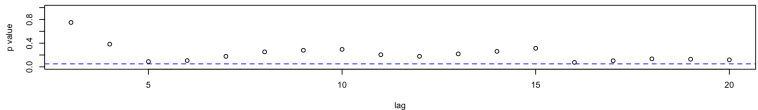
ACF of Residuals



Normal Q-Q Plot of Std Residuals



p values for Ljung-Box statistic





Model 6: SARIMA(0, 2, 1) \times (1, 0, 0)₁₂ with Regressors

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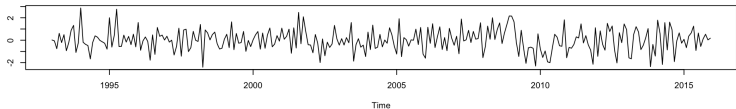
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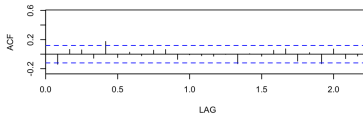
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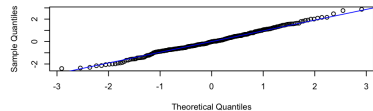
Standardized Residuals



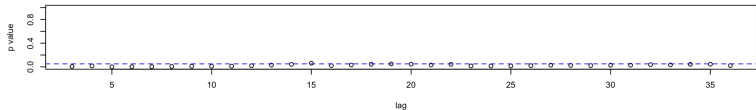
ACF of Residuals



Normal Q-Q Plot of Std Residuals



p values for Ljung-Box statistic





Model 7: ARIMA(1, 2, 1) with Regressors

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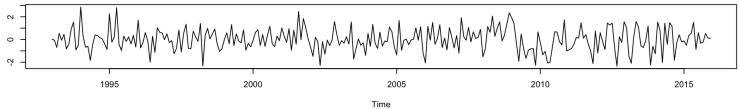
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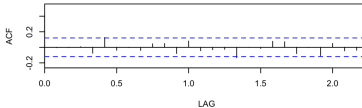
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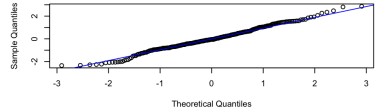
Standardized Residuals



ACF of Residuals



Normal Q-Q Plot of Std Residuals



p values for Ljung-Box statistic

