The Transmission of Information in the Information Age

APPENDIX I

Jenna Christensen and Michael O'Hara, PhD
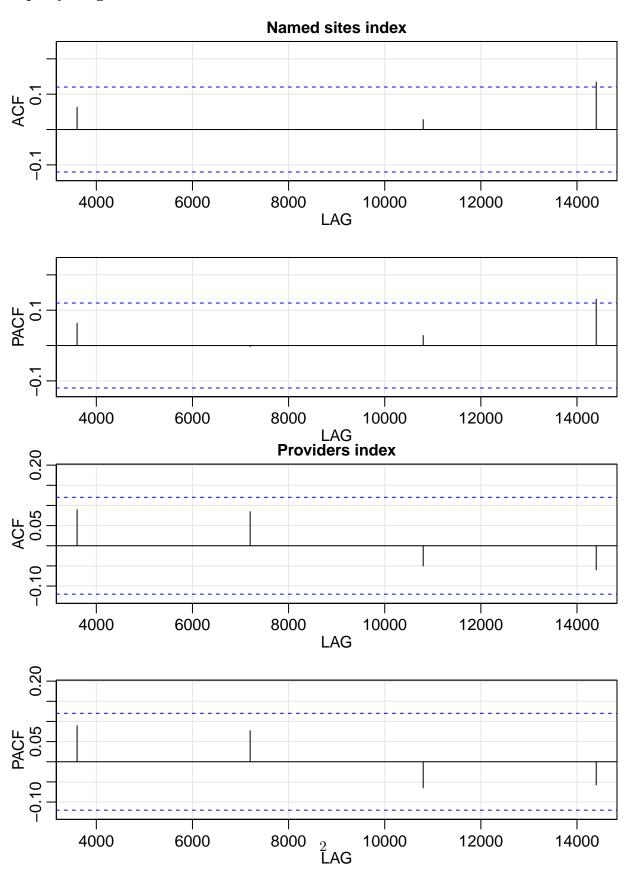
ARMA SPECIFICATION FOR MEAN MODELS

Specification for the mean model consists of three steps:

1. Initial examination of ACF and PACFs for the series

2. Ljung-Box testing at different lags
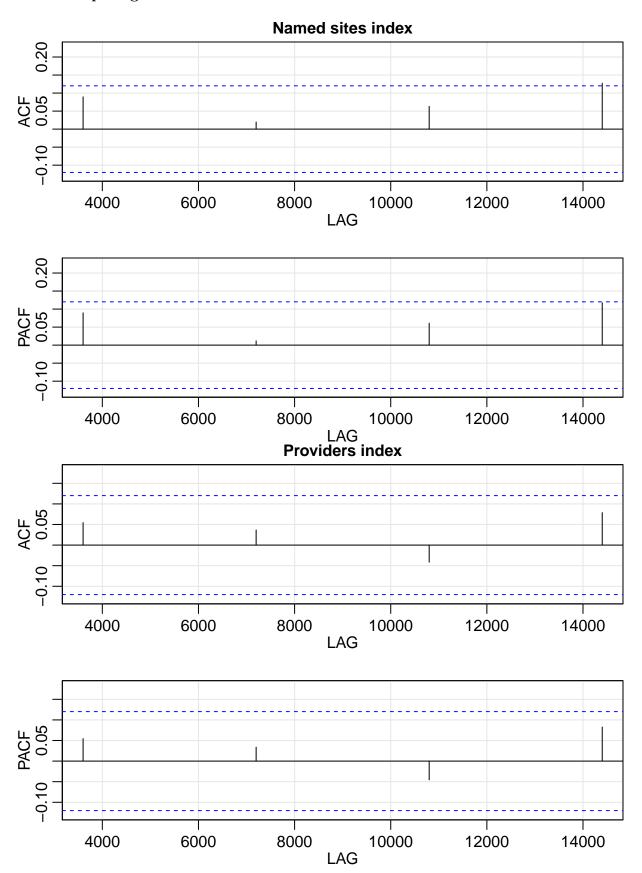
3. Diagnostic testing of assumed ARMA(0,0) structure

We also look at each stock return series on its own to get a sense of where any irregularities might be.

ACF/PACF ANALYSIS

Equally weighted indices

Named sites index

Providers index

Market cap weighted indices

LJUNG-BOX TESTS

One lag and four lags shown for each series with each weighting

Table 1: ARMA Model Ljung-Box Statistics

		Equal Weighted		Market Cap Weighted	
Group	DF	X-sq	P-Value	X-sq	P-value
Named	1	1.115	0.291	2.242	0.134
Named	4	6.457	0.168	8.072	0.089
Provider	1	2.250	0.134	0.836	0.360
Provider	4	5.973	0.201	3.457	0.484

All tests fail to reject the null hypothesis of no serial correlation in the residuals.

General conclusion: (0,0) structure is appropriate for the ARMA part. We test this by running ARMA (0,0) on each series and examining the standardized residuals
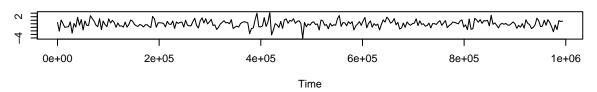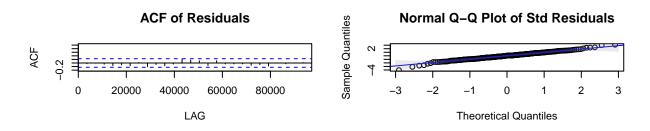
ARMA (0,0) DIAGNOSTICS
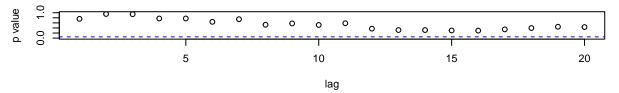
Equally weighted series

Named sites

```
## initial  value -4.517924
## iter   1 value -4.517924
## final  value -4.517924
## converged
## initial  value -4.517924
## iter   1 value -4.517924
## final  value -4.517924
## converged
```

Model: (0,0,0)   **Standardized Residuals**

ACF of Residuals   **Normal Q–Q Plot of Std Residuals**
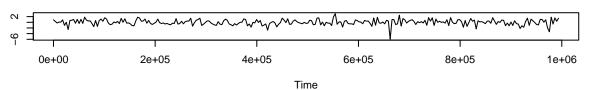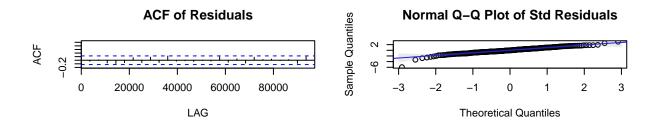
p values for Ljung–Box statistic
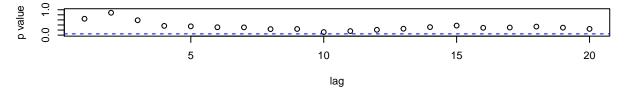
Providers

```
## initial  value -4.700614
## iter   1 value -4.700614
## final  value -4.700614
## converged
## initial  value -4.700614
## iter   1 value -4.700614
## final  value -4.700614
## converged
```

Model: (0,0,0)   **Standardized Residuals**

ACF of Residuals   **Normal Q–Q Plot of Std Residuals**
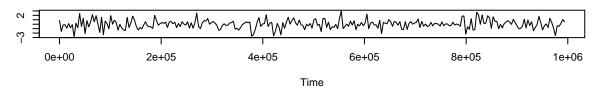
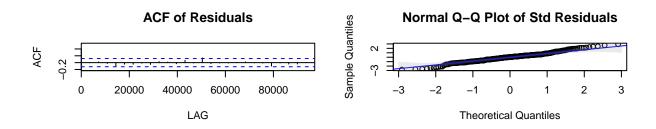**p values for Ljung–Box statistic**

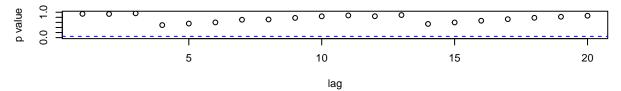# Market cap weighted series

Named sites

```
## initial  value -4.445620
## iter   1 value -4.445620
## final  value -4.445620
## converged
## initial  value -4.445620
## iter   1 value -4.445620
## final  value -4.445620
## converged
```

Model: (0,0,0) **Standardized Residuals**

ACF of Residuals

Normal Q–Q Plot of Std Residuals
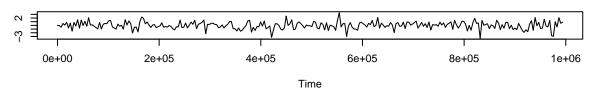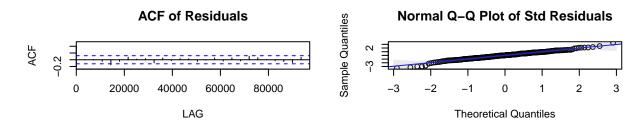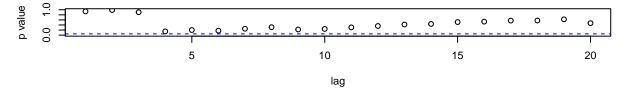
p values for Ljung–Box statistic

Providers

```
## initial  value -4.726638
## iter   1 value -4.726638
## final  value -4.726638
## converged
## initial  value -4.726638
## iter   1 value -4.726638
## final  value -4.726638
## converged
```
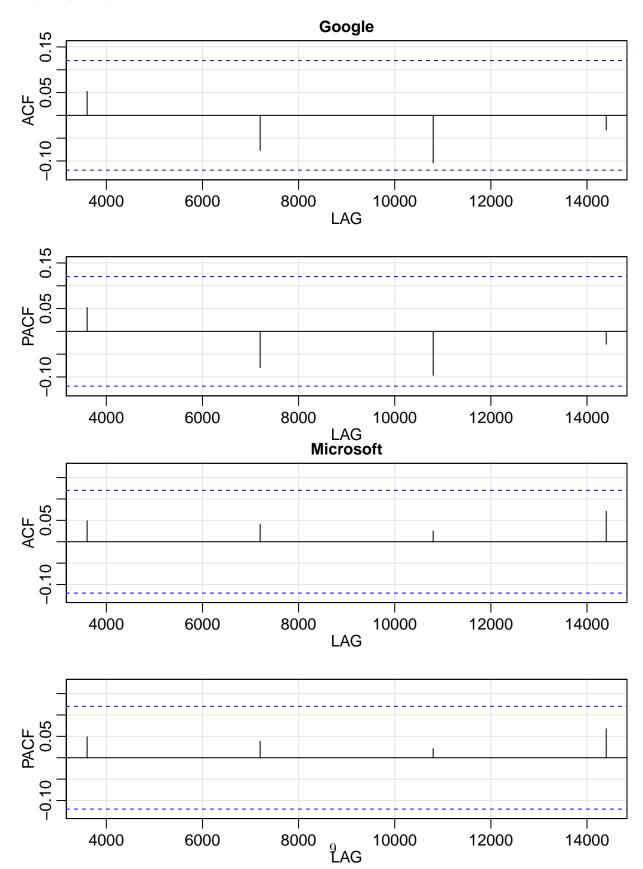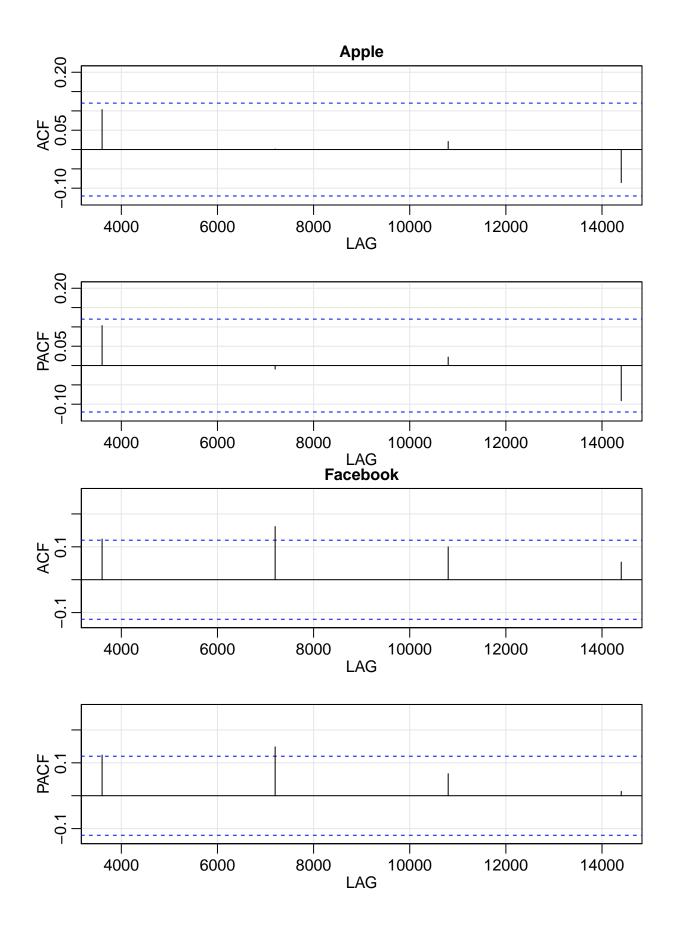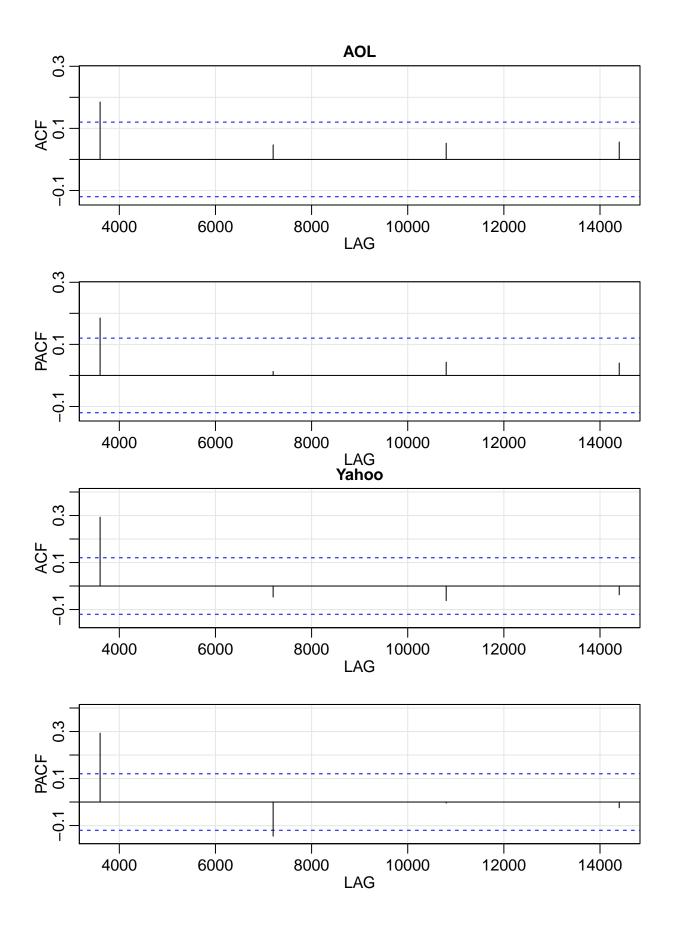
Model: (0,0,0)   **Standardized Residuals**

ACF of Residuals   **Normal Q–Q Plot of Std Residuals**

p values for Ljung–Box statistic

EXAMINING INDIVIDUAL STOCKS

Named sites

Google

Microsoft

Apple

Facebook

Providers

Comcast

Charter

ATT

Verizon
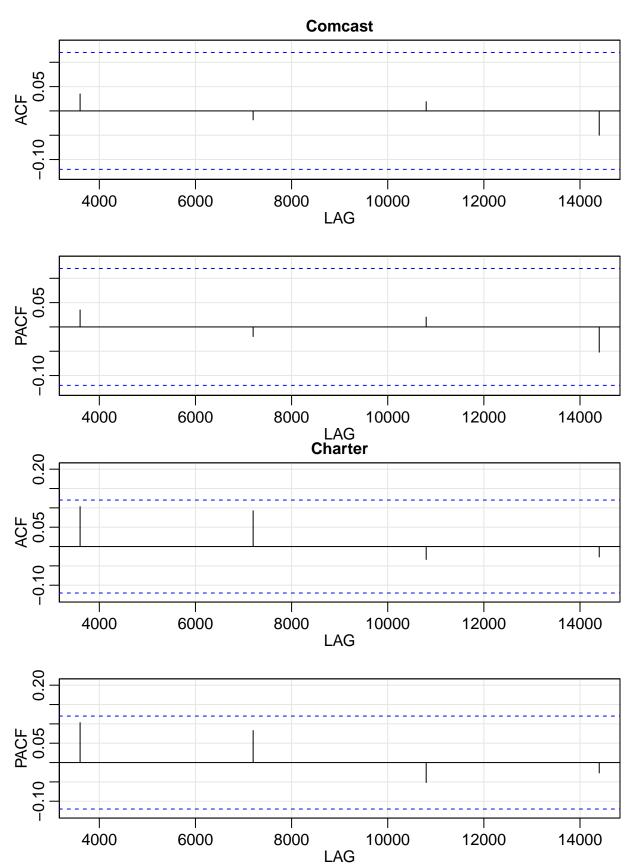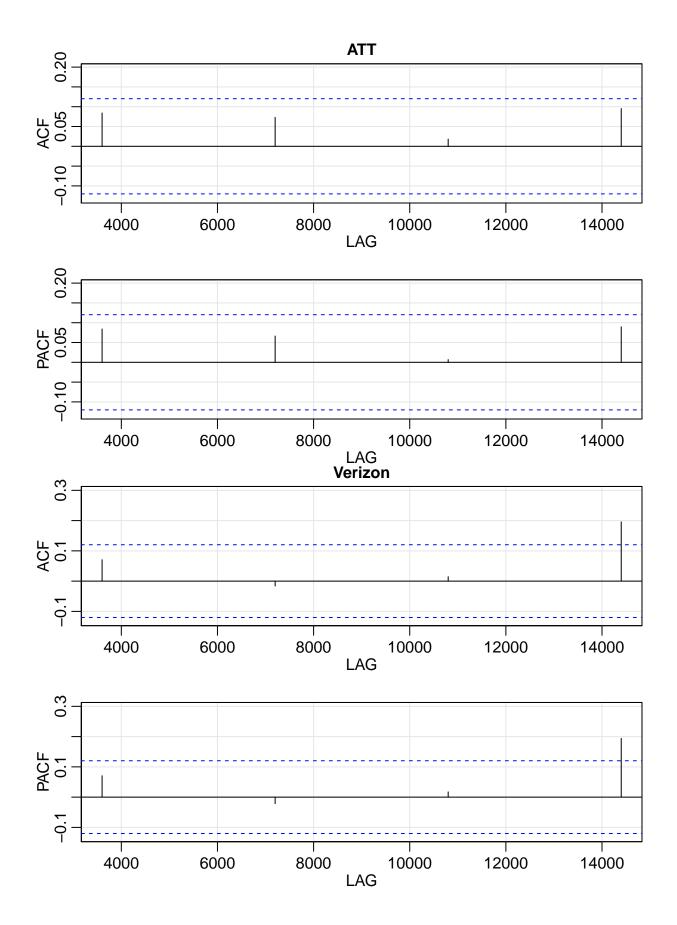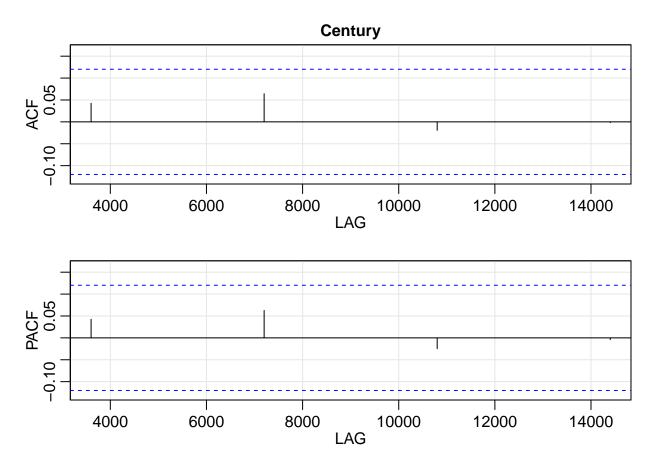
Century

Notes: A few of the named sites, such as Yahoo and AOL seem to have spikes at the first lag. This may be the reason for the p-value of .08 for the Ljung-Box of the market cap weighted series for sites. However, equal weighting eliminates this. We tested an ARMA(1,1) for this series and the main results do not change. Therefore, for parsimony, we keep to ARMA(0,0).

Providers show nothing aside from a weird spike at 4 lags for Verizon. There is no good reason why in a daily returns model, four lags would be significant and it does not affect the index.