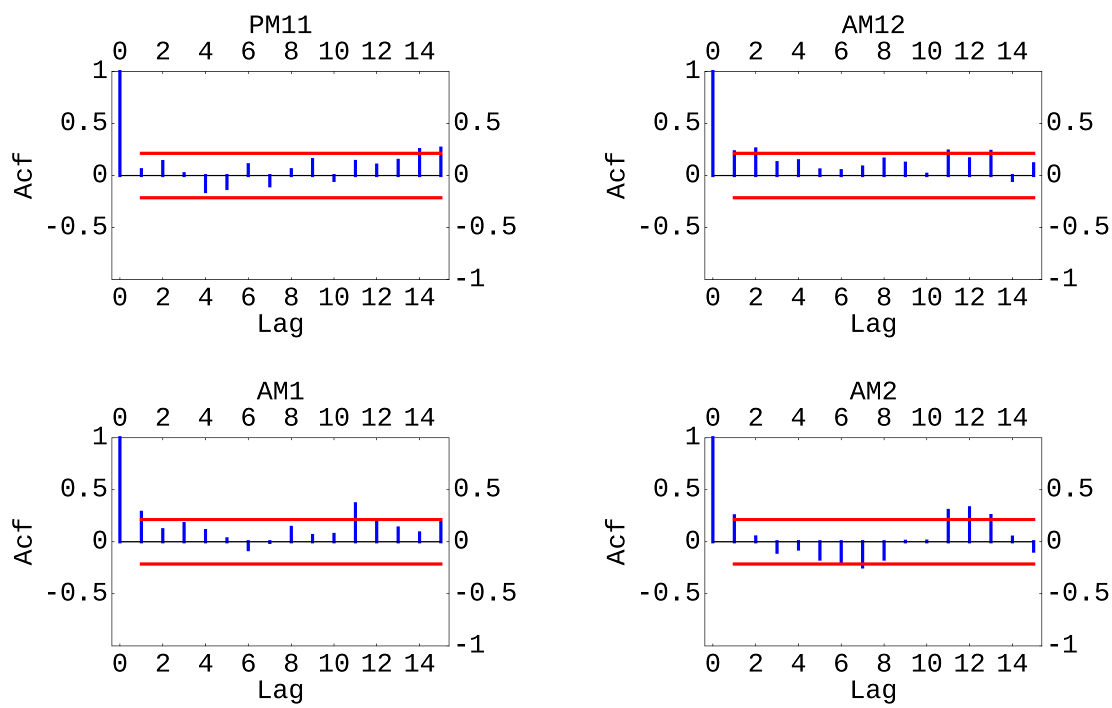
MVA

Autocorrelation Function

Based on the autocorrelation function, the following models were tenatively identified.

Data	ARMA Model
PM11	(0, 0, 0)
AM12	$(0, 0, 2)\,(0, 0, 1)_{12}$
AM1	$(0, 0, 1)\,(0, 0, 1)_{12}$
AM2	$(0, 0, 1)\,(0, 0, 1)_{12}$



Intervention Analysis

May 1996 corresponds to observation #49 in this series. A step intervention model defined by,

$$z_t = \mu + \delta\ \xi_t + N_t \tag{1}$$

where N_t is the error term. Based on the pre-intervention data we assume initially that N_t is normal and independent, so ordinary multiple linear regression can be used. The intervention series are defined by,

$$\xi_t^{(1)} = \begin{cases} 0 & t < 49 \\ 1 & t \geq 49 \end{cases}$$

For each series the ARMA component has been tentatively identifed as follows. For PM11,

$$N_t = a_t \tag{2}$$

For AM12,

$$N_t = (1 - \theta_1 \mathfrak{B} - \theta_2 \mathfrak{B}^2)(1 - \Theta_1 \mathfrak{B}^{12}) \tag{3}$$

For AM1,

$$N_t = (1 - \theta_1 \mathfrak{B})(1 - \Theta_1 \mathfrak{B}^{12}) \tag{4}$$

and for AM2

$$N_t = (1 - \theta_1 \mathfrak{B})(1 - \Theta_1 \mathfrak{B}^{12}) \tag{5}$$

where $a_t \sim \mathrm{NID}(0, \sigma_a^2)$ and $\mathfrak{B}$ denotes the backshift operator on t, $\mathfrak{B}\, a_t = a_{t-1}$. After fitting my exact maximum likelihood the parameter estimates are shown in the tables below. The intervention parameter δ is statistically significant on a two-sided test for PM11 at 9.4% and for AM1 at 4.7%. No departures from model assumptions were indicated in the residual analysis.

- **PM11**

	Estimate	SE	P-Value
μ	3.833	0.21	0
δ	**-1.028**	**0.424**	**0.015**

- **AM12**

	Estimate	SE	P-Value
μ	2.632	0.315	0
δ	-0.23	0.577	0.691
θ_1	-0.103	0.106	0.333
θ_2	-0.233	0.106	0.028
Θ_1	-0.185	0.107	0.085

- **AM1**

	Estimate	SE	P-Value
μ	3.341	0.352	0
δ	-0.127	0.622	0.839
θ_1	-0.148	0.108	0.171
Θ_1	-0.305	0.104	0.003

- **AM2**

	Estimate	SE	P-Value
μ	3.341	0.352	0
δ	-0.127	0.622	0.839
θ_1	-0.148	0.108	0.171
Θ_1	-0.305	0.104	0.003

■ Intervention Visualizations