(d).

By incorporating an AR(1) process––that is, a first-order autoregressive process––into the original model, we obtained a corrected model as shown below:

where at is the white-noise term.

Table 4.1. Parameter estimates

| **Variable** | **DF** | **Estimate** | **Standard Error** | **t Value** | **Approx Pr > |t|** |
| --- | --- | --- | --- | --- | --- |
| **Intercept** | 1 | 0.8970 | 0.2162 | 4.15 | <.0001 |
| **UNEMP** | 1 | -0.0650 | 0.0242 | -2.69 | 0.0079 |
| **INFL** | 1 | -69.4850 | 6.5029 | -10.69 | <.0001 |
| **PARTY** | 1 | -0.2270 | 0.0917 | -2.47 | 0.0142 |
| **AR1** | 1 | 0.4484 | 0.0640 | 7.01 | <.0001 |

Since P-values for coefficients in Table 4.1 are all smaller than α = 0.05, all coefficients in this model are significantly different than zero on a statistical basis. (See (f). for a more detailed explanation.)

Table 4.2 Model parameters of multivariate regression in (a).

| **Ordinary Least Squares Estimates** | | | |
| --- | --- | --- | --- |
| **SSE** | 51.7279627 | **DFE** | 197 |
| **MSE** | 0.26258 | **Root MSE** | 0.51242 |
| **SBC** | 318.807922 | **AIC** | 305.594702 |
| **MAE** | 0.30575741 | **AICC** | 305.798784 |
| **MAPE** | 878.713674 | **HQC** | 310.941344 |
| **Durbin-Watson** | 2.8921 | **Total R-Square** | 0.2956 |

Table 4.3 Model parameters of corrected regression

| **Unconditional Least Squares Estimates** | | | |
| --- | --- | --- | --- |
| **SSE** | 41.3653534 | **DFE** | 196 |
| **MSE** | 0.21105 | **Root MSE** | 0.45940 |
| **SBC** | 279.4012 | **AIC** | 262.884676 |
| **MAE** | 0.30751106 | **AICC** | 263.192368 |
| **MAPE** | 1005.07363 | **HQC** | 269.567978 |
| **Durbin-Watson** | 2.0269 | **Transformed Regression R-Square** | 0.3858 |
|  |  | **Total R-Square** | 0.4367 |

According to Table 4.2 and 4.3, MSE (mean squared error) of the corrected model (0.21105) is smaller than the original model (0.26258), which suggests the autoregressive model has a higher explanatory power. A higher total R-square (0.4367>0.2956) also indicates the same fact.

(e).

Table 5.1 White-noise test for residuals

| **Autocorrelation Check for White Noise** | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **To Lag** | **Chi-Square** | **DF** | **Pr > ChiSq** | **Autocorrelations** | | | | | |
| **6** | 3.13 | 6 | 0.7923 | -0.013 | -0.005 | 0.073 | 0.005 | -0.039 | 0.090 |
| **12** | 9.46 | 12 | 0.6629 | 0.038 | -0.076 | 0.004 | 0.075 | 0.062 | 0.113 |
| **18** | 16.46 | 18 | 0.5603 | 0.075 | 0.143 | 0.035 | -0.001 | 0.024 | 0.064 |
| **24** | 25.02 | 24 | 0.4049 | 0.010 | 0.035 | 0.105 | -0.088 | 0.095 | 0.092 |

Because the residual term series {at} is constructed zero-mean and homoscedastic, χ2 testing, which tests for autocorrelation, sufficiently tests for whether the time series {at} is a white-noise series. According to Table 5.1, all P-values are greater than the significance level of 0.05; therefore, we cannot reject null hypotheses that autocorrelation of {at} at all lags are statistically equal to zero. Consequently, the residual term at is statistically regarded as white-noise term.

(f).

The corrected model can be expresses as follows:

where at is the white-noise term.

According to Table 4.1, all P-values for the three coefficients of IV are smaller than the 0.05 significance level. For each of these tests, null hypothesis is H0: βi = 0, and alternative hypothesis is Ha: βi ≠ 0, where βi stands for the i-th variable (UNEMP, INFL, and PARTY). As a result, for each of the three variables, the null hypothesis is rejected and we can therefore conclude that its coefficient is significantly different from zero on a statistical basis, which means that all three variables are significant at α = 0.05.