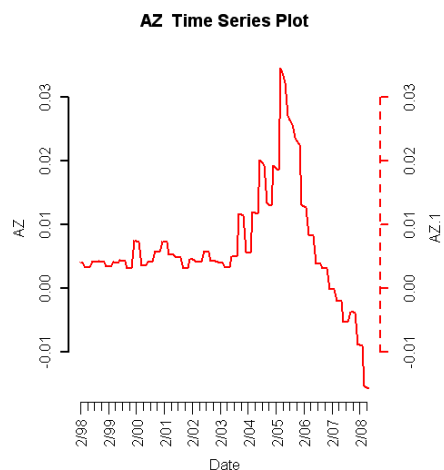


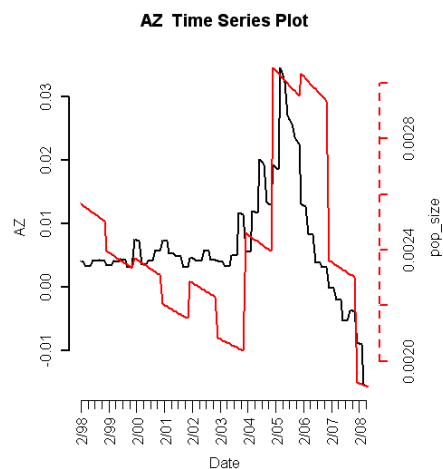
I. PHASE I AND PHASE II RESULTS – ARIZONA (AZ)

A. Plots of Predictors vs. HPI (simple returns)

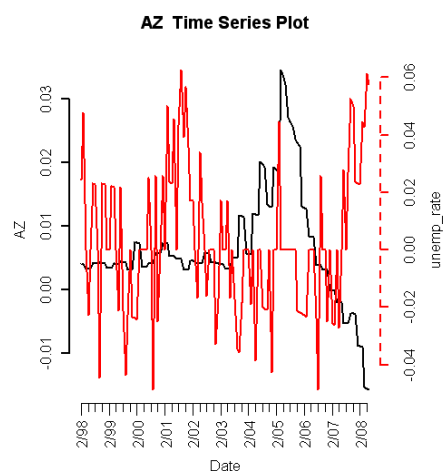
Original HPI Series



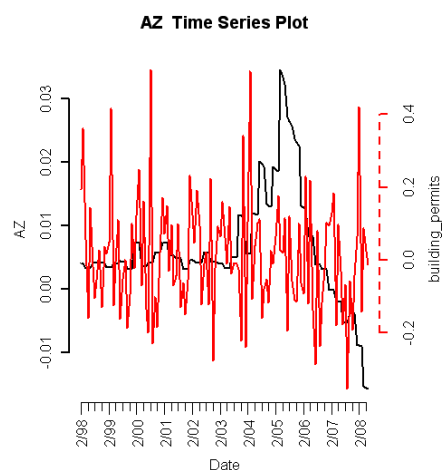
Population Size



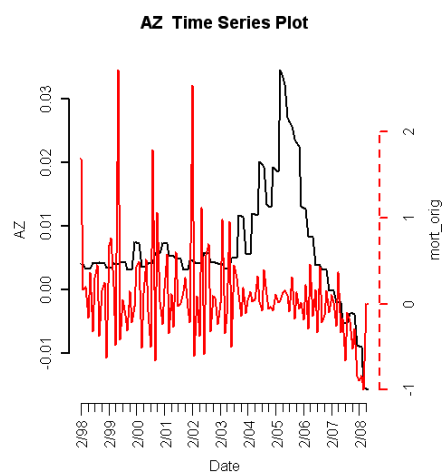
Unemployment Rate



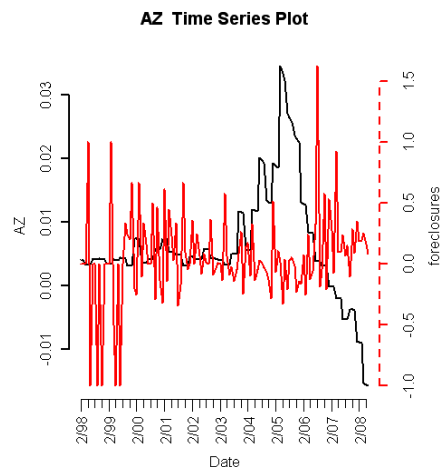
Building Permits



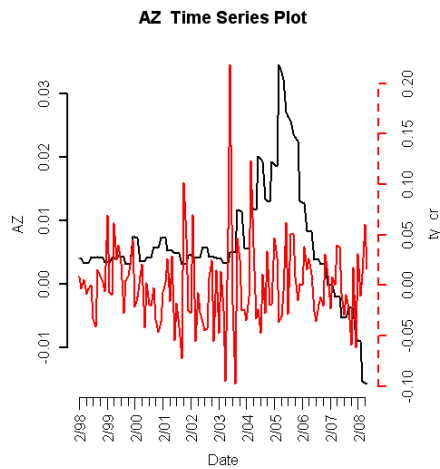
Mortgage Originations



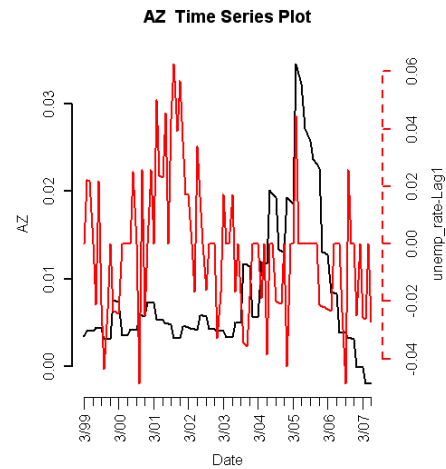
Foreclosures



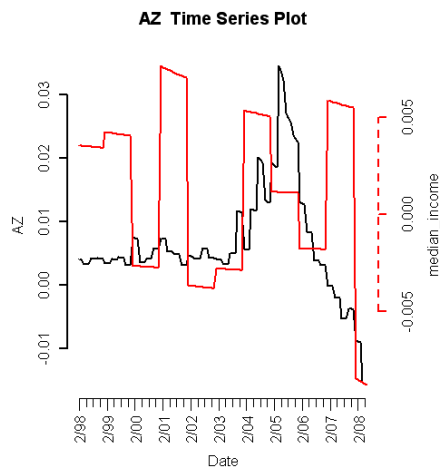
30-Year Commitment Rate



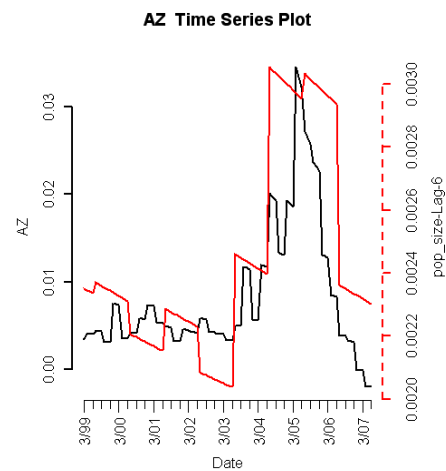
Unemployment Rate (leading 1 month)



Median Income

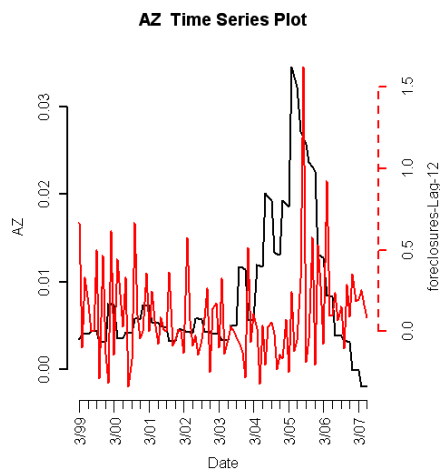


Population Size (lagging 6 months)



B. Plot of Lagged Predictors vs. HPI (simple returns)

Foreclosures (lagging 12 months)



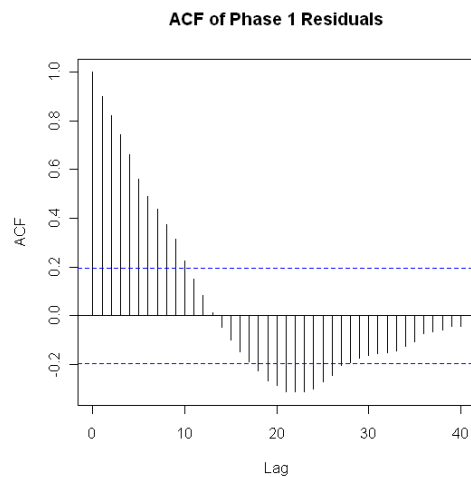
C. Final RLM Model

Robust Linear Model (significant predictors only)

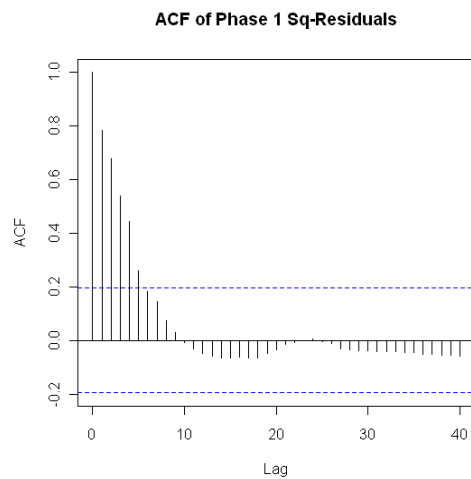
Coefficients:			
	Value	Std. Error	t-value
Population Size (Lag 0)	3.07	0.19	16.56
Foreclosures (Lag -12)	-0.003	0.002	-2.03
Unemployment Rate-(Lag 1)	-0.04	0.02	-1.88

1. Phase I

ACF of Residuals



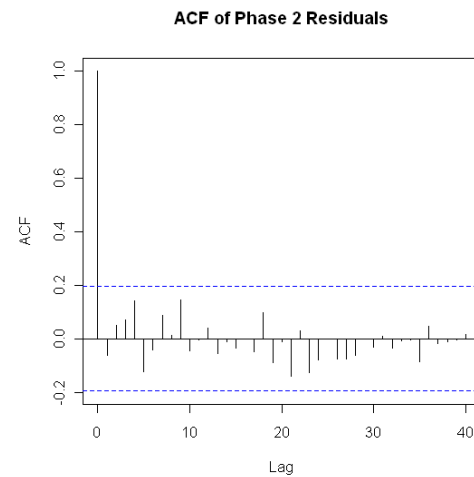
ACF of Sq-Residuals



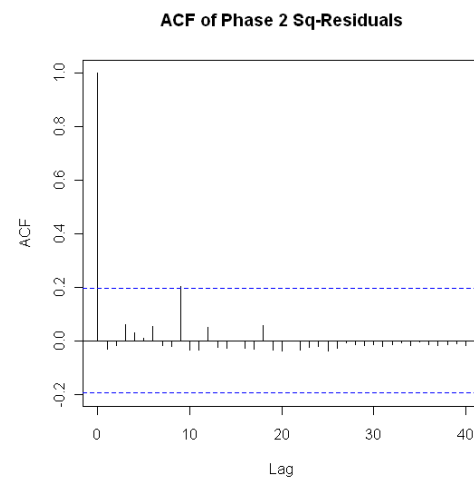
2. Phase II

Estimates:			
	Value	Std. Error	t-value
ϕ_1	0.91	0.04	23.16

ACF of Residuals

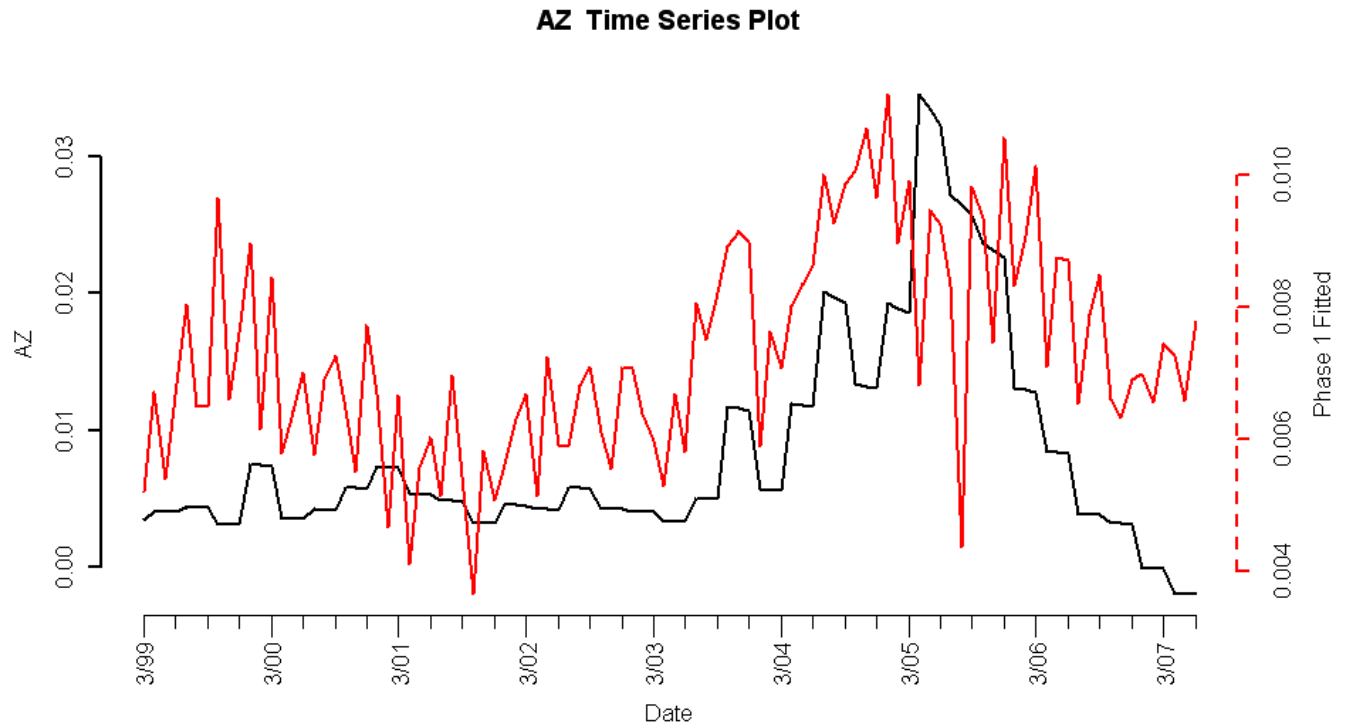
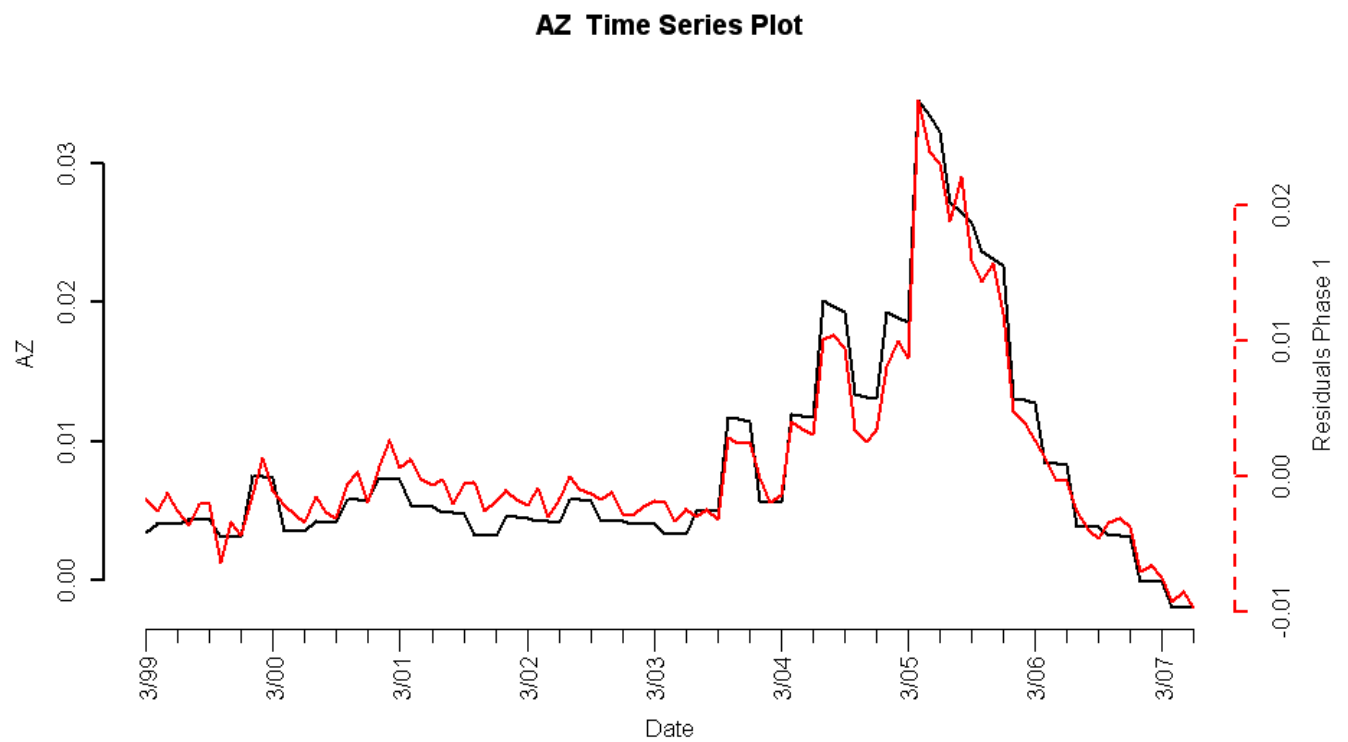


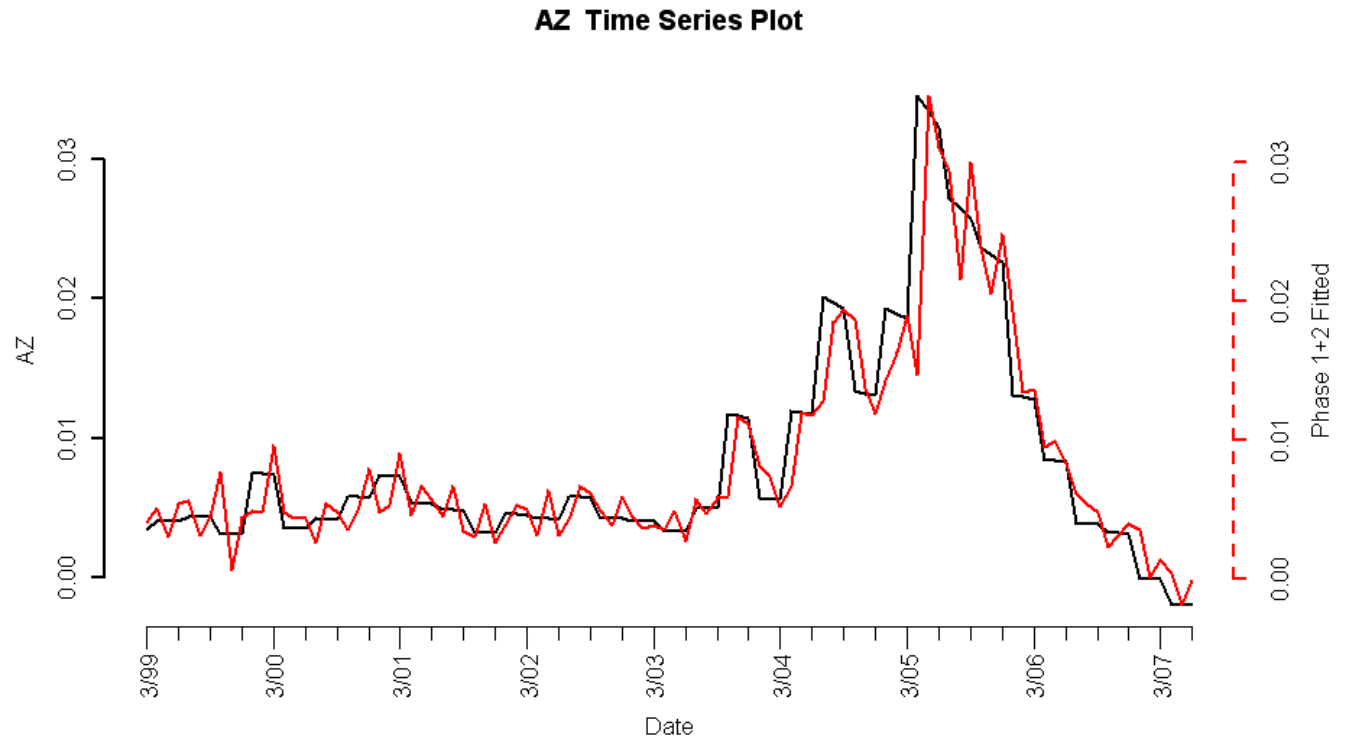
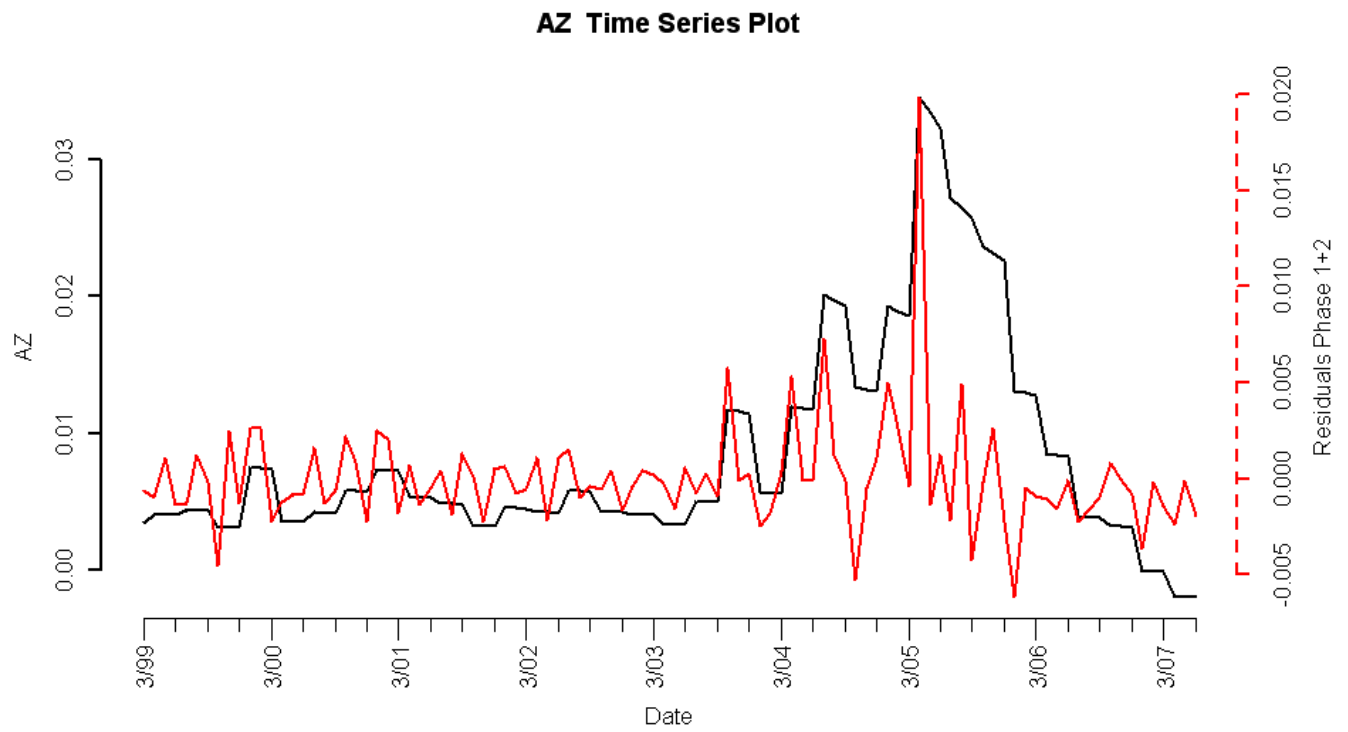
ACF of Sq-Residuals



3. Model Checking Diagnostics

Coefficients:				
	Lag	Test-Statistic	p-value	Adj. Dof
After Phase 1				
ADF	1	-1.66	< 0.1	
Box-Ljung Residuals	12	374.15	0.0	12
d-Estimate (GPH)		0.91		
After ARMA(1,0)				
Box-Ljung Residuals	12	8.70	0.65	12-1
Box-Ljung Sq.-Residuals	12	6.16	0.91	12

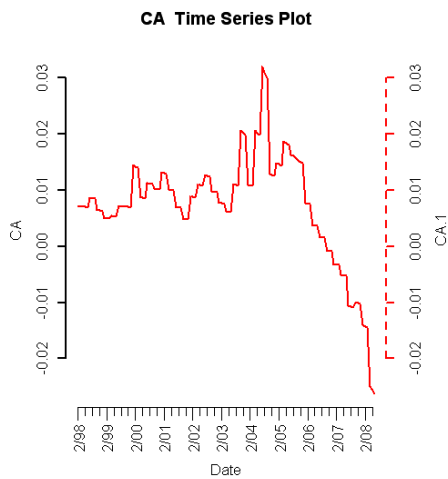
*E. Fitted vs. Actual Plots*Fitted Phase 1 Fitted Values vs. HPIPhase1 Residuals vs. HPI

Fitted Phase 1/2 Values vs. HPIPhase 2 Residuals vs. HPI

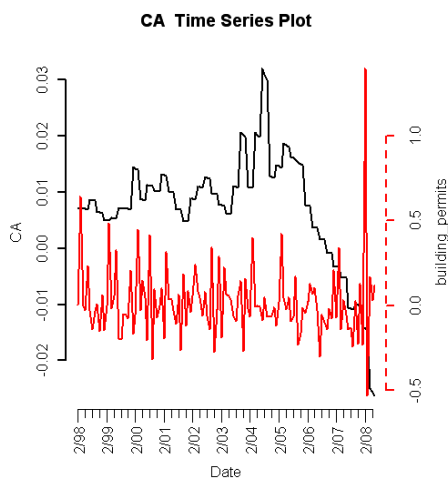
II. PHASE I AND PHASE II RESULTS – CALIFORNIA (CA)

A. Plots of Predictors vs. HPI (simple returns)

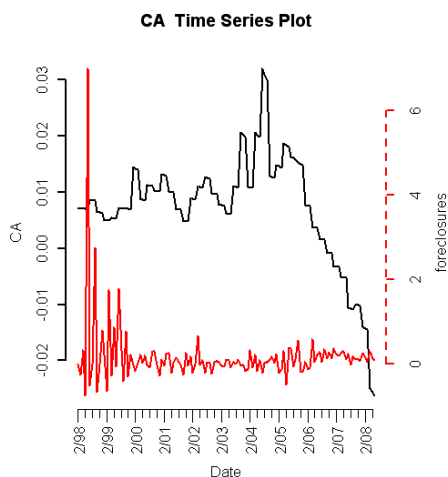
Original HPI Series



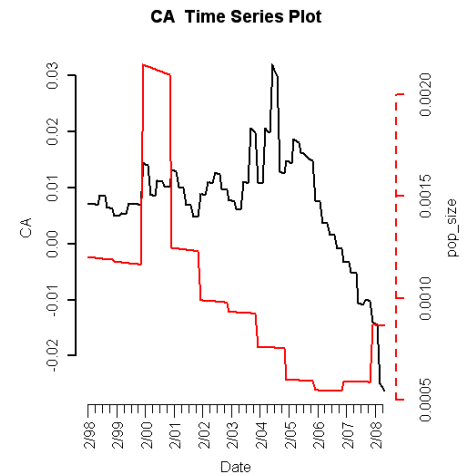
Building Permits



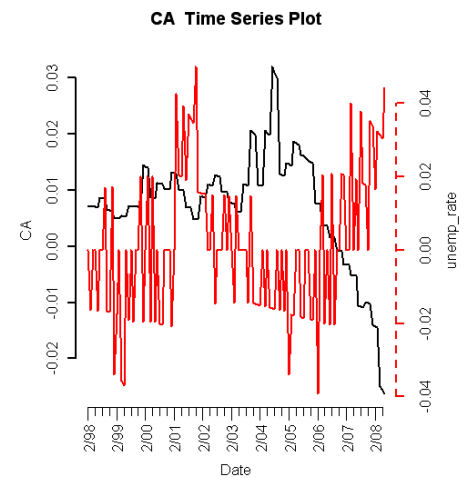
Foreclosures



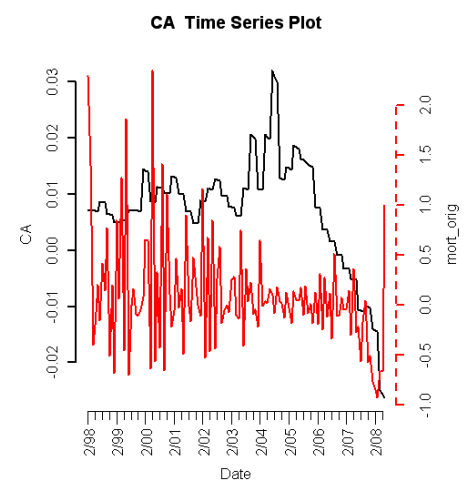
Population Size

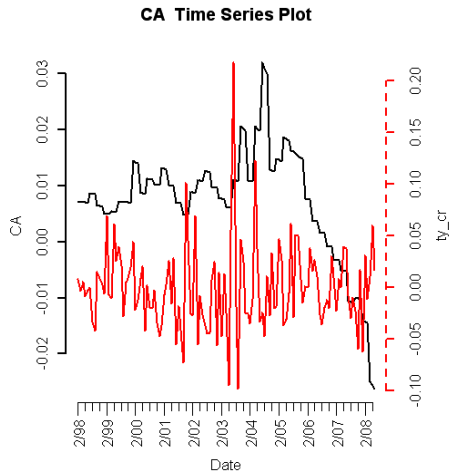
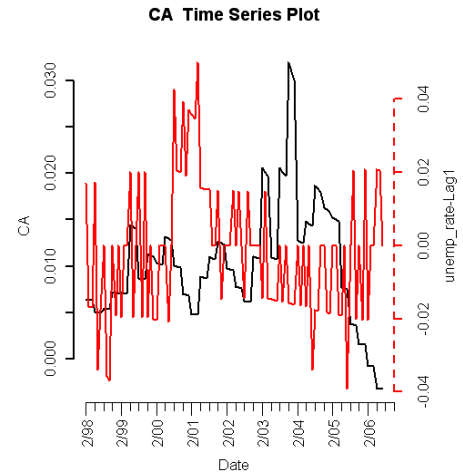
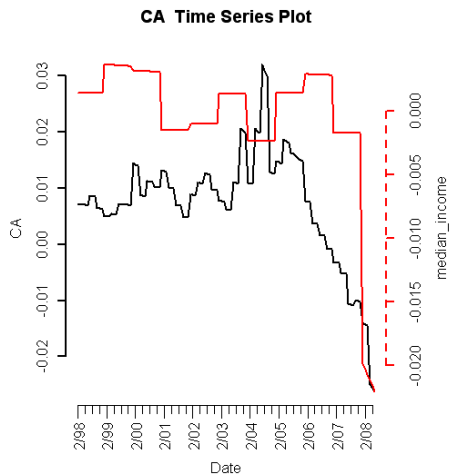
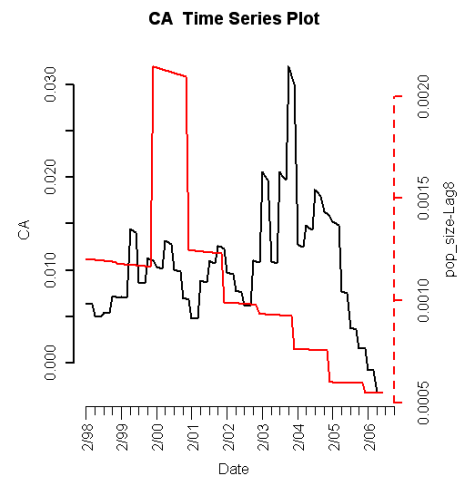
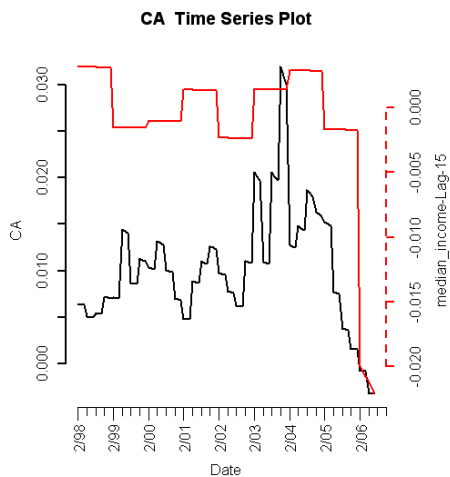
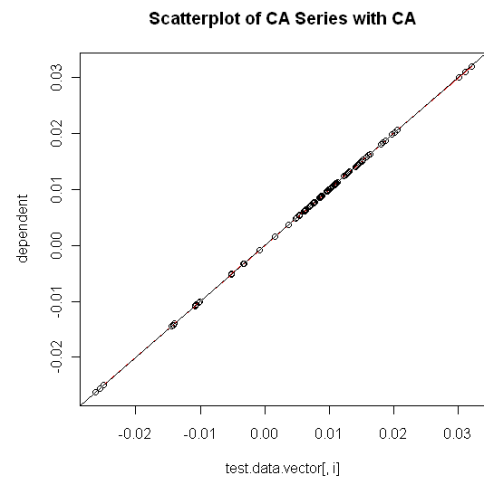


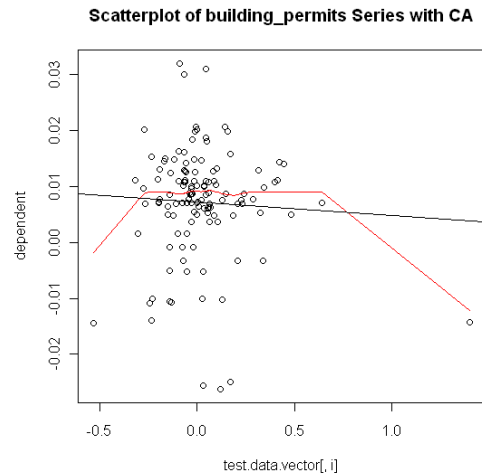
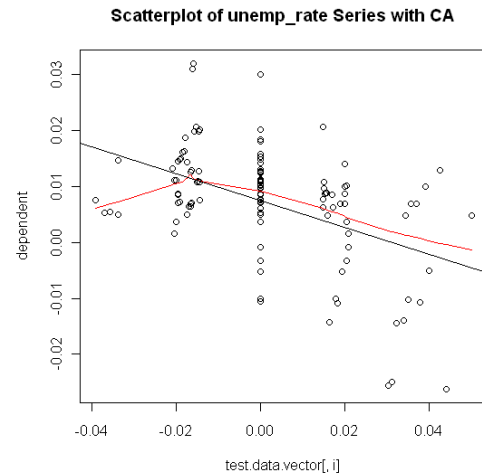
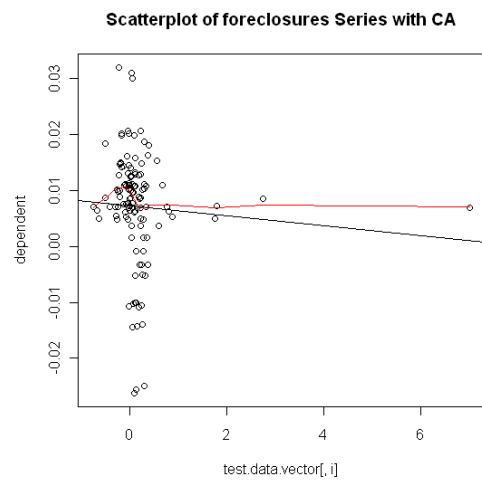
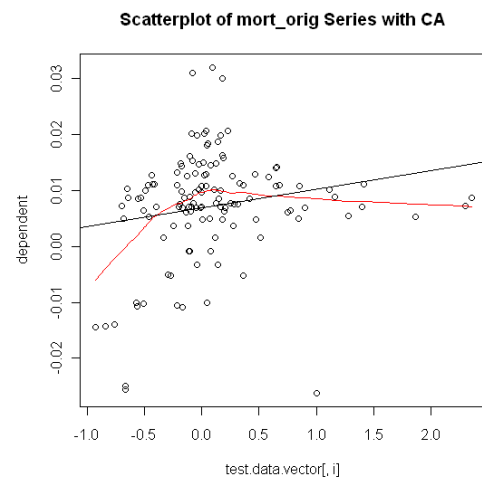
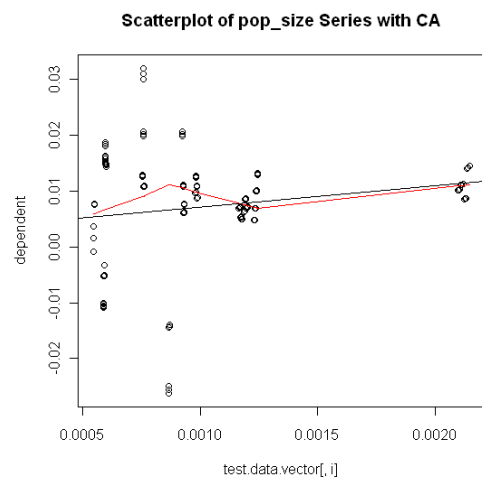
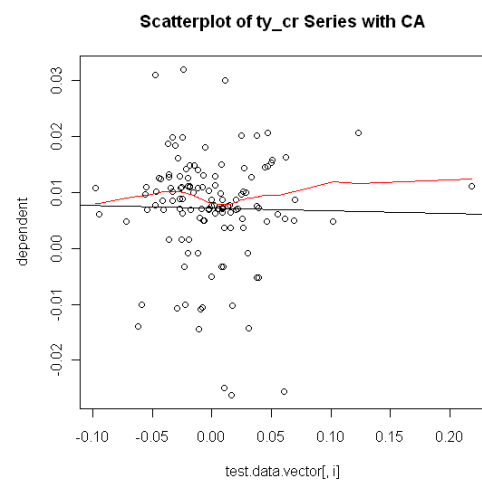
Unemployment Rate

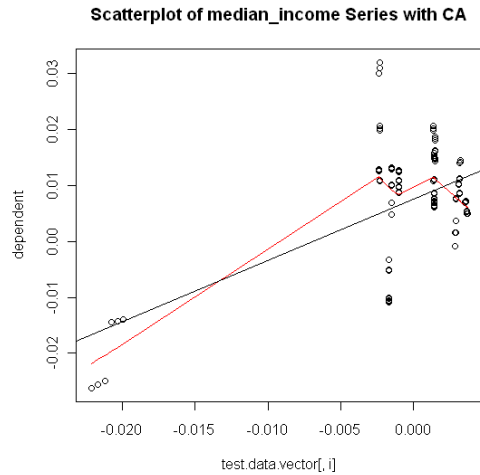
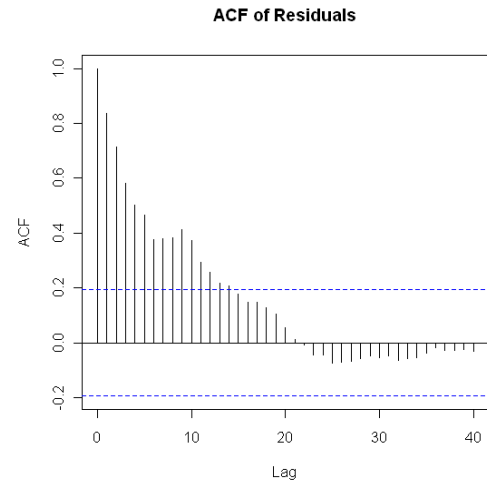
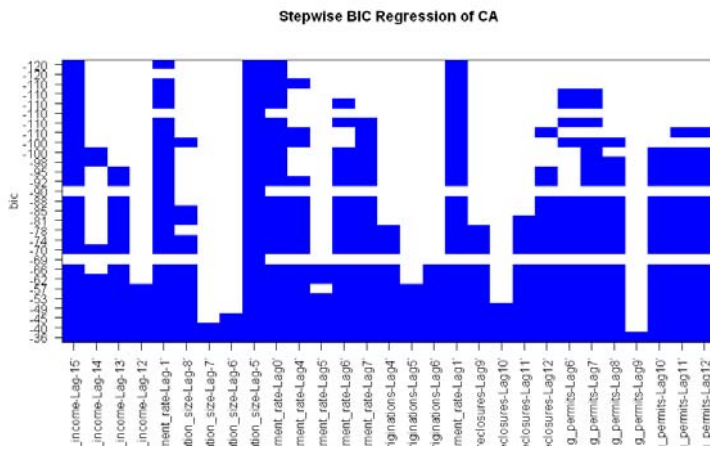
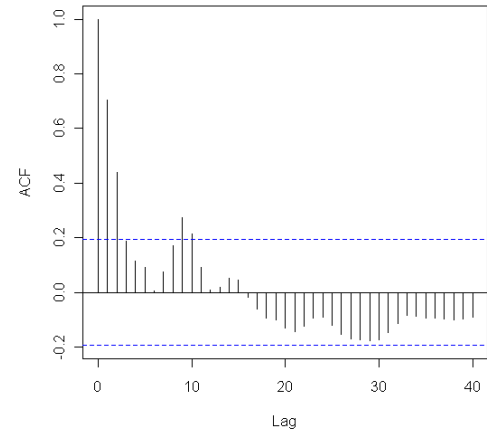


Mortgage Originations



30-Year Commitment RateUnemployment Rate (leading 1 month)Median IncomePopulation Size (leading 8 months)*B. Plot of Lagged Predictors vs. HPI (simple returns)*Median Income (lagging 15 months)*C. Scatterplots (simple return)*HPI vs. HPI

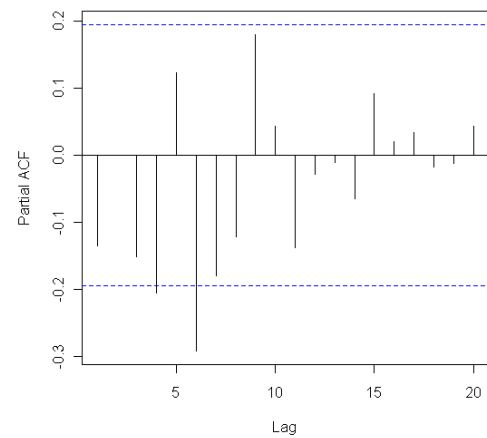
HPI vs. Building PermitsHPI vs. Unemployment RateHPI vs. ForeclosuresHPI vs. Mortgage OriginationsHPI vs. Population SizeHPI vs. 30-Year Commitment Rate

HPI vs. Median Income1. Phase IACF of ResidualsC. Exhaustive Stepwise RegressionACF of Sq-ResidualsD. Final RLM ModelRobust Linear Model (significant predictors only)**Coefficients:**

	Value	Std. Error	t-value
Median Income (lag -15)	0.3219	0.0982	3.2764
Unemployment Rate (lag 1)	-0.0926	0.0297	-3.1174
Population Size (lag 8)	9.0048	0.5141	17.5146

Robust Linear Model (one of each predictor)**Coefficients:**

	Value	Std. Error	t-value
Median Income (lag -15)	0.2995	0.1146	2.6136
30-Yr Commitment Rate	0.0033	0.0144	0.2303
Mortgage Originations	-0.0016	0.0013	-1.2404
Foreclosures	0.0033	0.0144	0.2303
Building permits	-0.0016	0.0013	-1.2404
Unemployment Rate (lag 1)	0.0033	0.0144	0.2303
Population Size (lag 8)	-0.0016	0.0013	-1.2404

PACF and ADF Test**PACF of Differenced Residuals**

2. Phase II

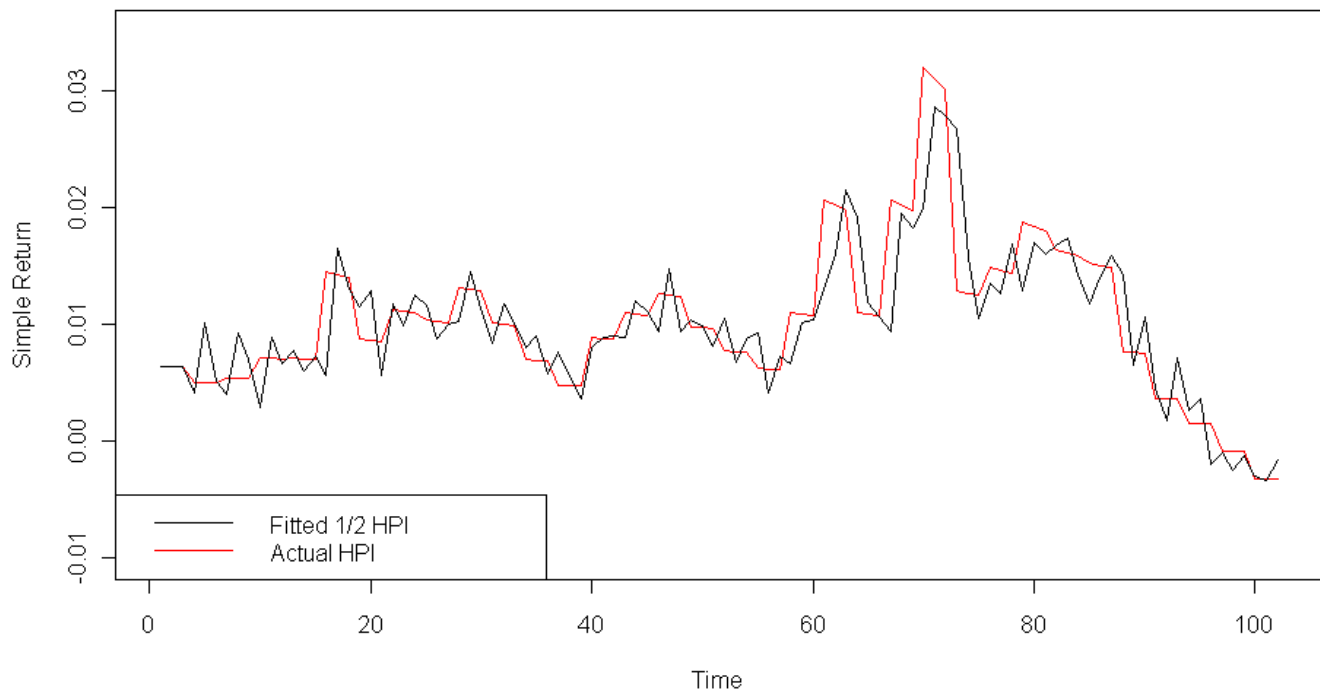
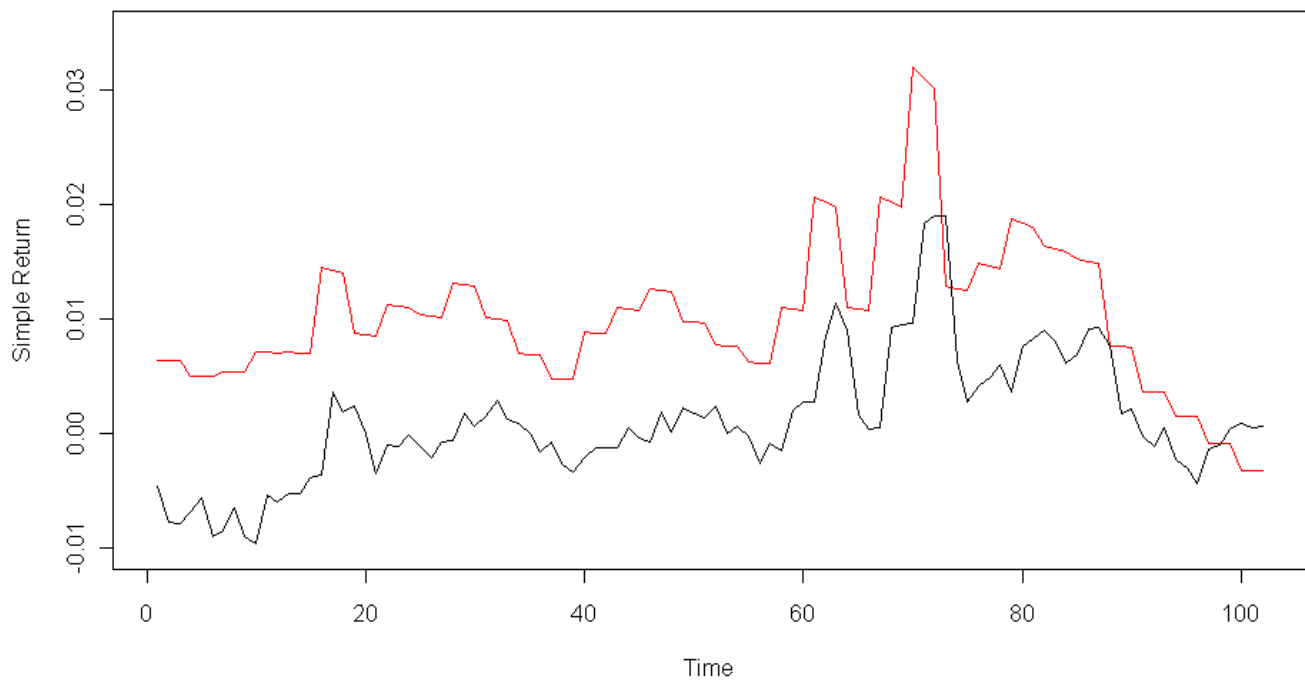
Estimates:

	Value	Std. Error	t-value	Pr(> t)
ϕ_2	0.3295	0.0467	7.06E+00	1.68E-12
θ_1	0.2399	0.0609	3.9410	0.0001
ω	0.0000	0.0000	5.64E+00	1.67E-08
α_3	4.26E-01	1.19E-01	3.58E+00	0.000344

3. Model Checking Diagnostics

Coefficients:

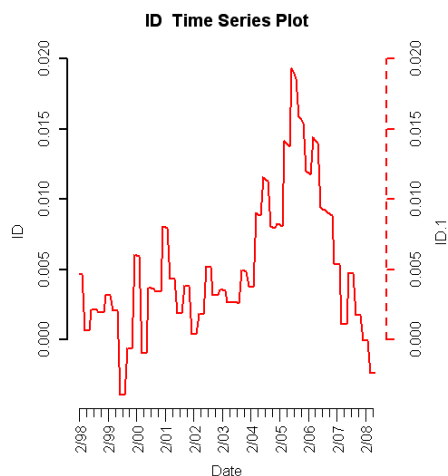
	Lag	Test-Statistic	p-value	Adj. Dof
After Phase 1				
ADF	7	-1.85	< 0.1	
Box-Ljung Residuals	12	316.81	0.0	12
d-Estimate (GPH)		0.53		
After ARMA()/GARCH()				
Box-Ljung Residuals	9	16.3451	0.0600	12-3
Box-Ljung Sq.-Residuals	8	8.8923	0.2828	12-4

*E. Fitted vs. Actual Plots*Fitted Phase 1/2 Values vs. HPI**Plot of Fitted 1/2 HPI vs. Actual HPI**Phase2 Residuals vs. HPI**Plot of Fitted HPI with Resids vs. Actual HPI**

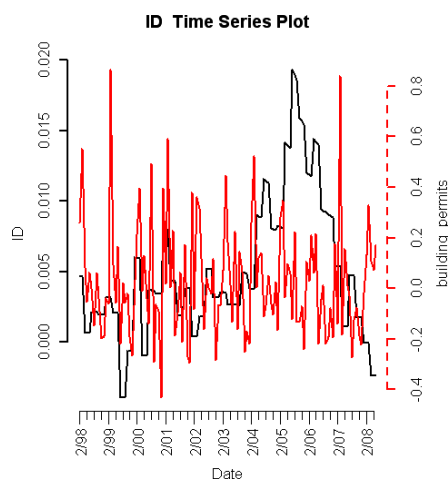
III. PHASE I AND PHASE II RESULTS – IDAHO (ID)

A. Plots of Predictors vs. HPI (simple returns)

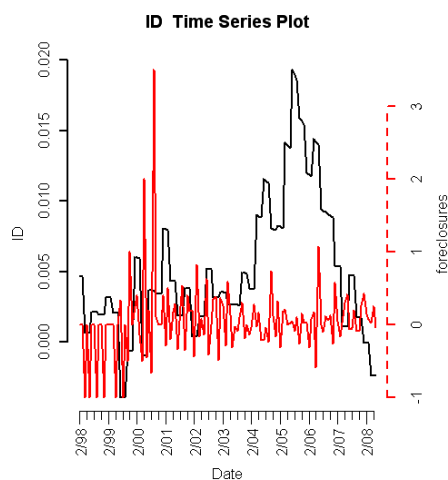
Original HPI Series



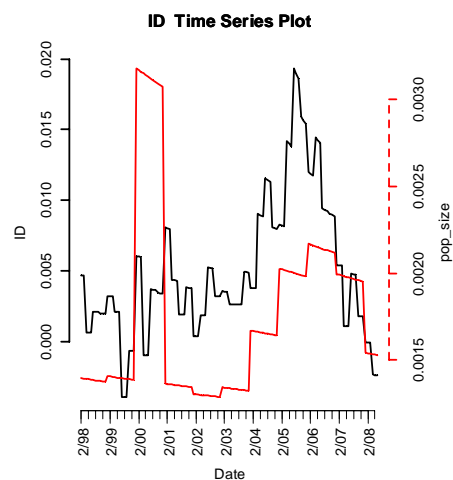
Building Permits



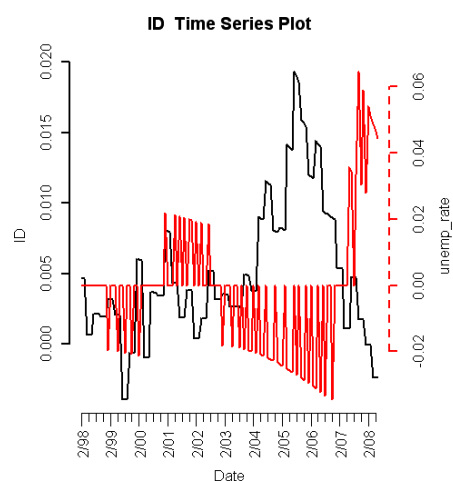
Foreclosures



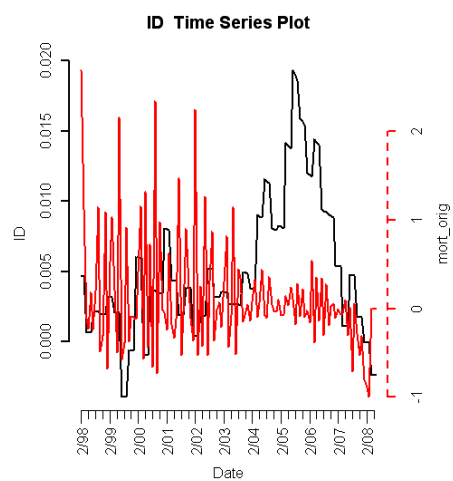
Population Size



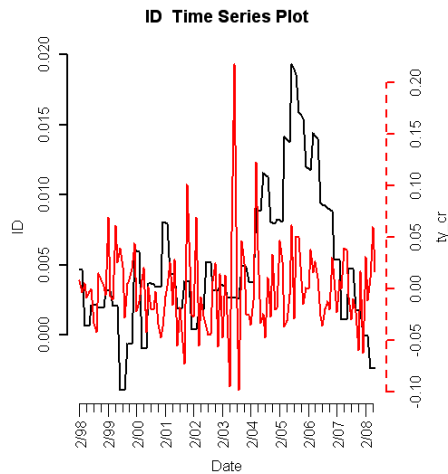
Unemployment Rate



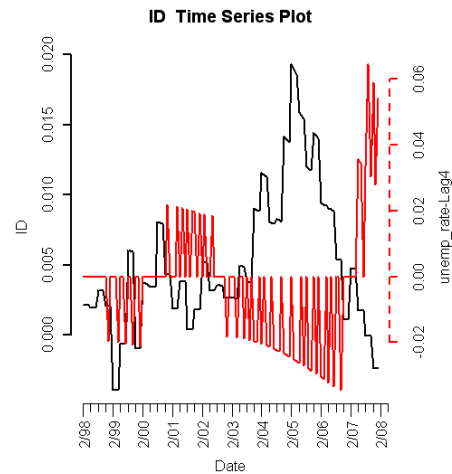
Mortgage Originations



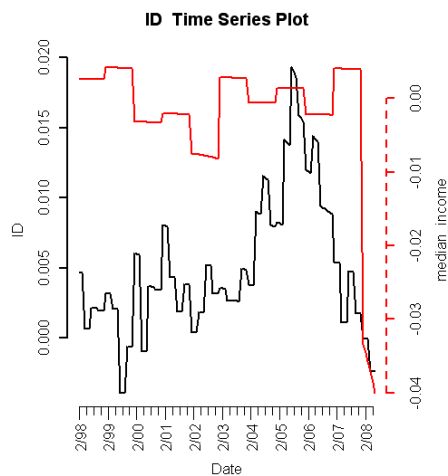
30-Year Commitment Rate



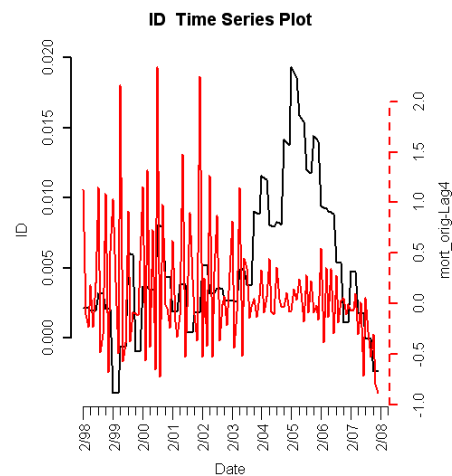
Unemployment Rate (leading 4 months)



Median Income

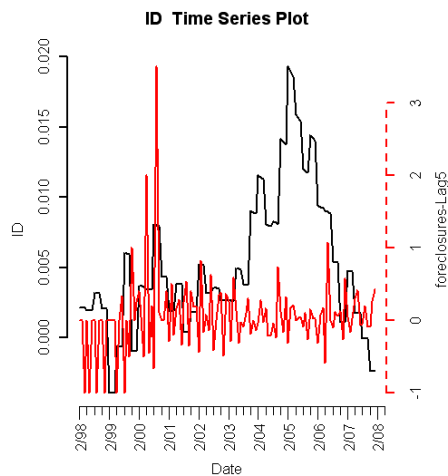


Mortgage Originations (leading 4 months)



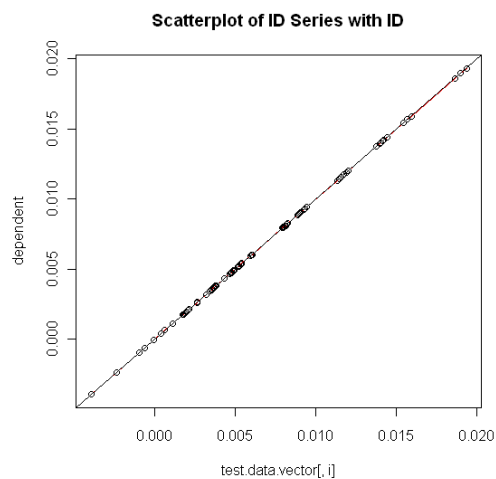
B. Plot of Lagged Predictors vs. HPI (simple returns)

Foreclosures (leading 5 months)

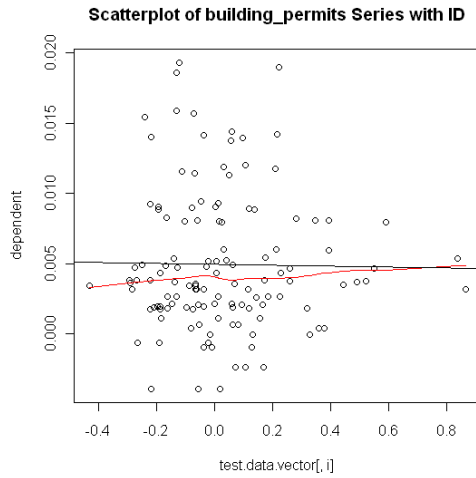


C. Scatterplots (simple return)

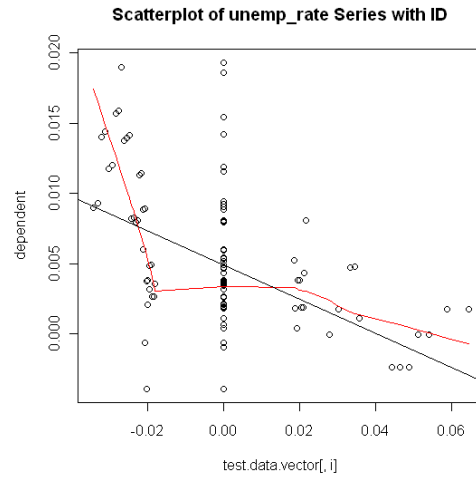
HPI vs. HPI



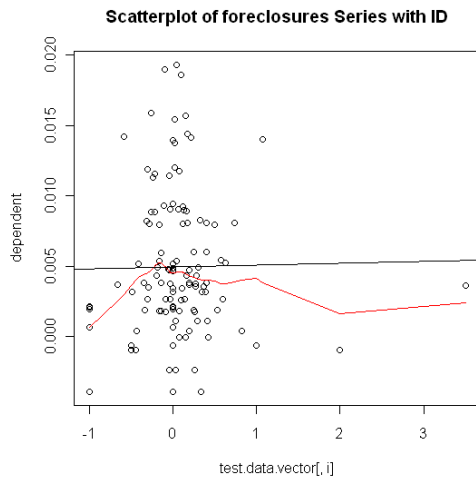
HPI vs. Building Permits



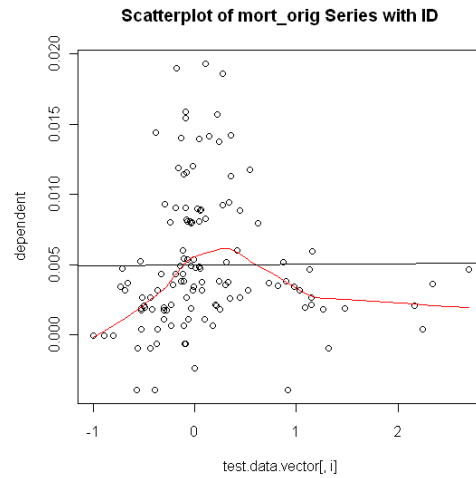
HPI vs. Unemployment Rate



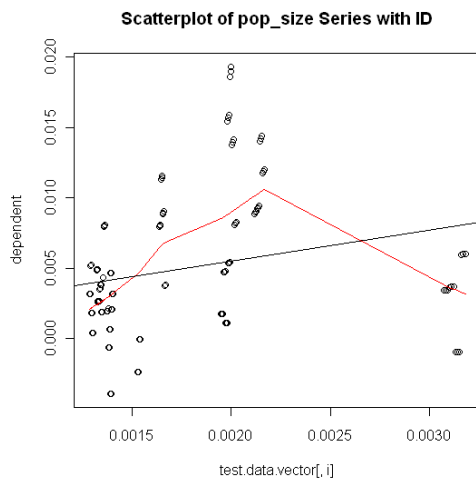
HPI vs. Foreclosures



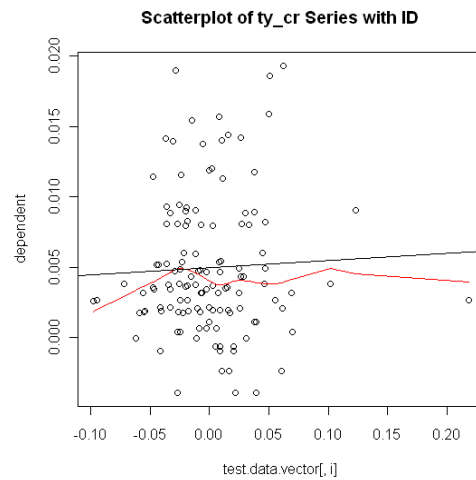
HPI vs. Mortgage Originations



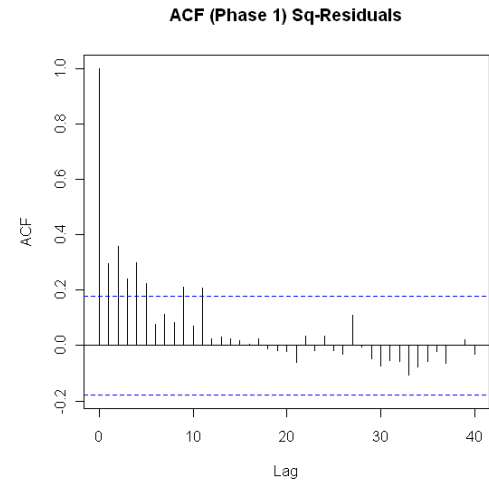
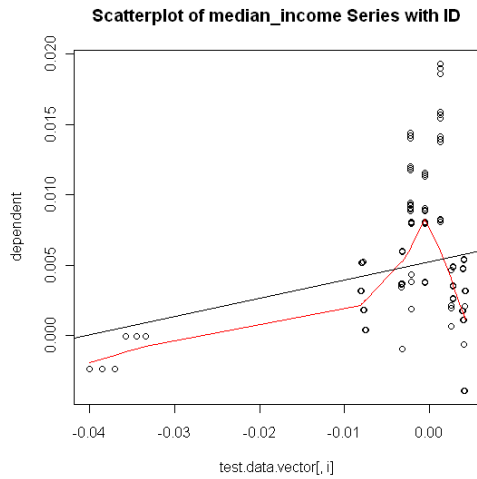
HPI vs. Population Size



HPI vs. 30-Year Commitment Rate



ACF of Sq-Residuals



C. Final RLM Model

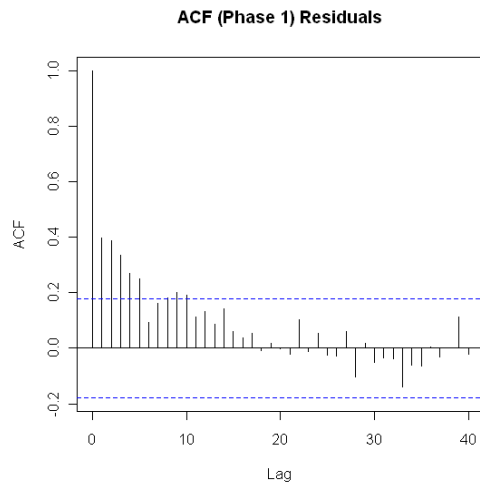
Robust Linear Model (significant predictors only)

Coefficients:

	Value	Std. Error	t-value
Median Income (Lag0)	-0.3124	0.0722	-4.3294
Mortgage Originations (Lag4)	0.0019	0.0009	2.1531
Unemployment Rate-(Lag4)	-0.2673	0.0357	-7.4893
Foreclosures (Lag5)	0.0015	0.0010	1.4566

1. Phase I

ACF of Residuals

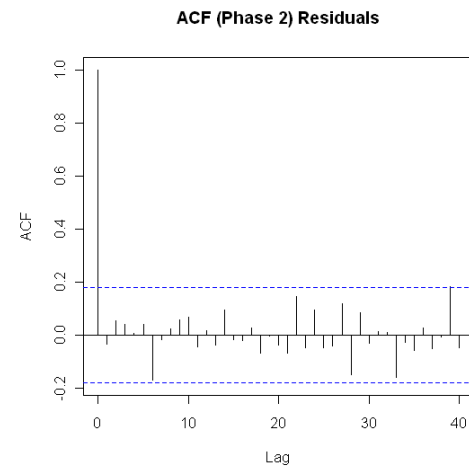


2. Phase II

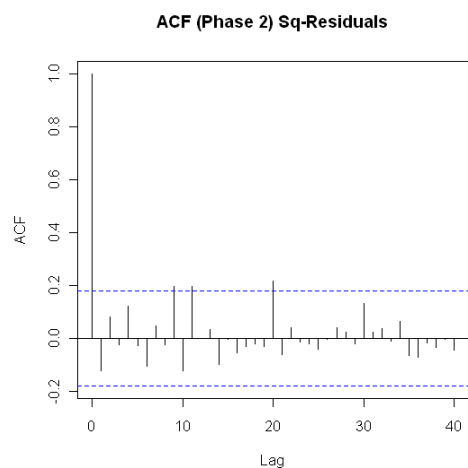
Estimates:

	Value	Std. Error	t-value
ar1	0.8740	0.0727	12.0220
ma1	-0.6023	0.1189	-5.0656
intercept	0.0034	0.0011	3.0909

ACF of Residuals



ACF of Sq-Residuals



3. Model Checking Diagnostics

Coefficients:

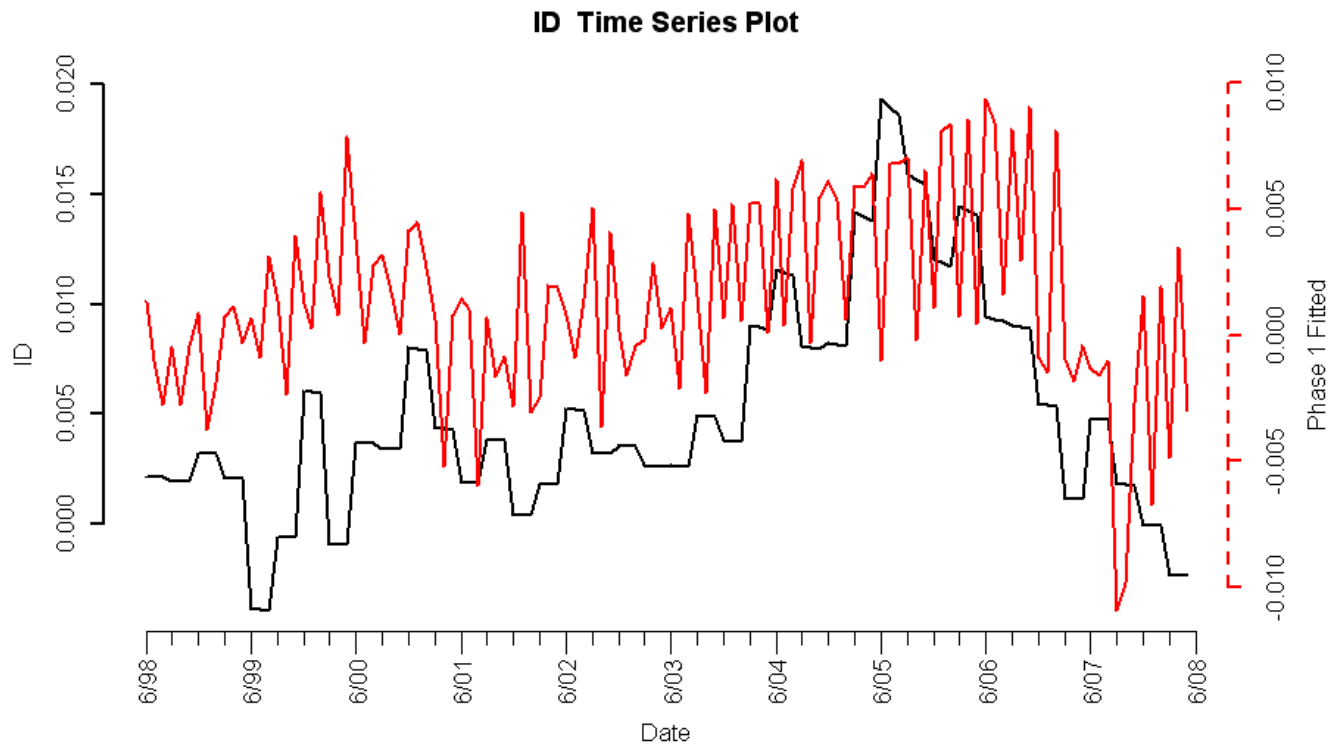
	Lag	Test-Statistic	p-value	Adj. Dof
ADF	3	-2.1027	< 0.05	
Box-Ljung Residuals	12	92.3465	0.0000	12
d-Estimate (GPH)		0.4836		

After ARMA(1,1)

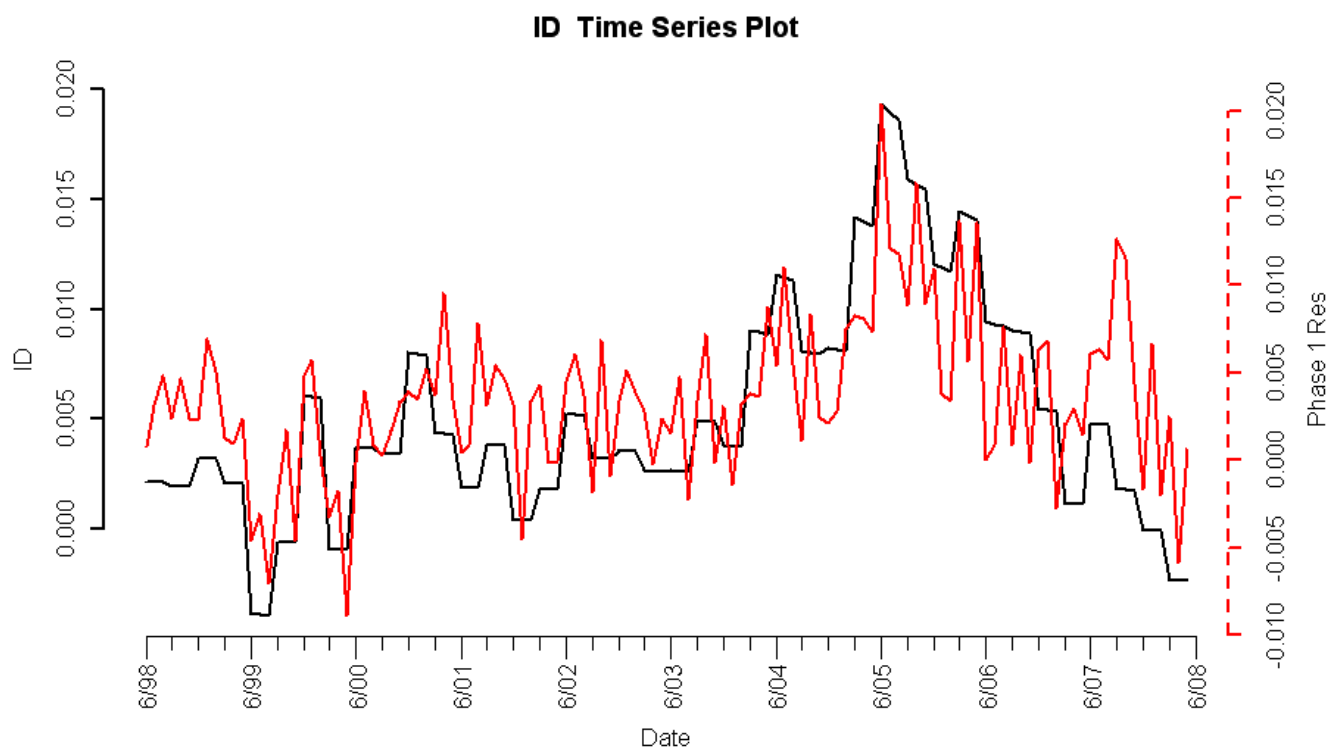
Box-Ljung Residuals	12	6.1028	0.8066	12-2
Box-Ljung Sq.-Residuals	12	18.7766	0.0941	12

E. Fitted vs. Actual Plots

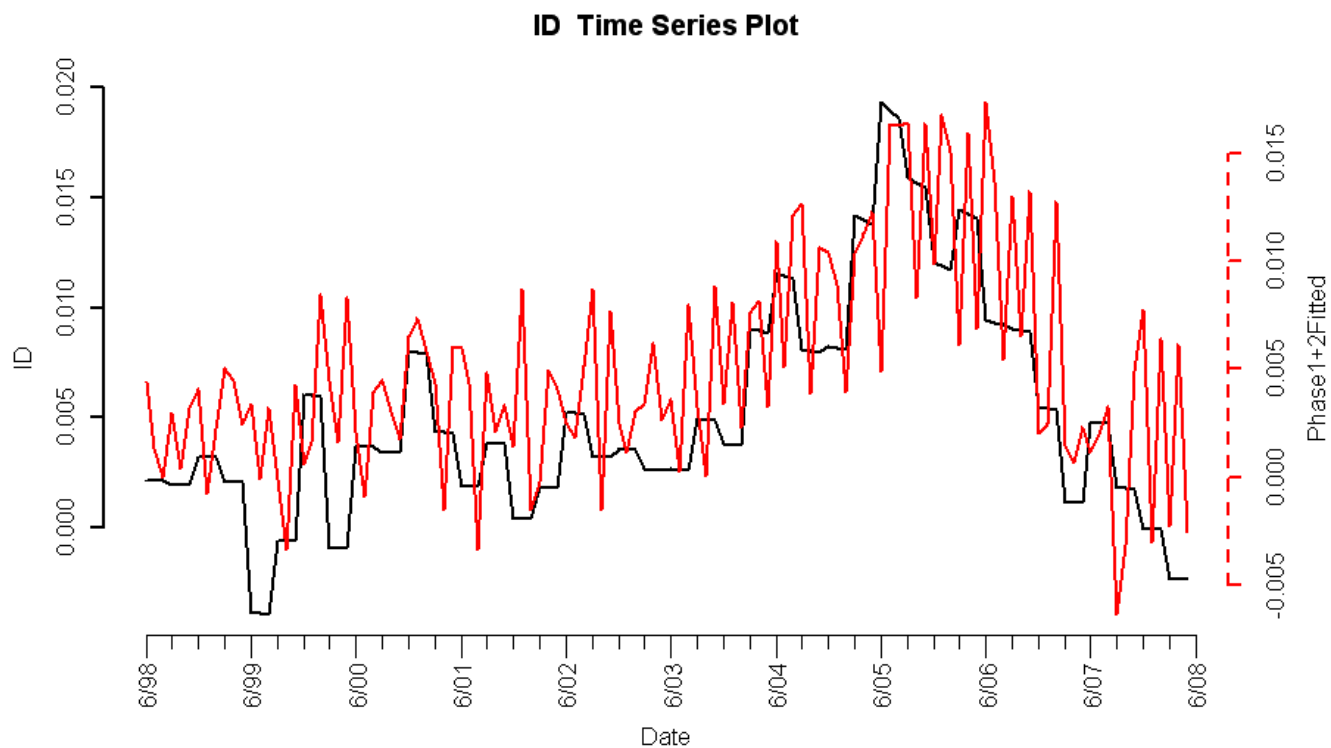
Fitted Phase 1 Fitted Values vs. HPI



Phase1 Residuals vs. HPI



Fitted Phase 1/2 Values vs. HPI



Phase 2 Residuals vs. HPI

