

Disentangling the Channels of the 2008-09 Recession

ASSA Session,
“Lectures in Macroeconomics”
8:00AM on Monday, January 4, 2010

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Mark W. Watson, Princeton University

A Standard 2-part Story:

- Wealth declines (housing) led to fall in consumption
- Financial Market Freeze

Housing Prices

Date	Case-Shiller 20 City Average
April 2006	202
December 2007	185
August 2008	163
May 2009	141
October 2009	145

Date	Household Net Worth (\$Trillions)	
	Real Estate	Total
2006:IV	22.9	64.5
2007:IV	20.9	64.5
2008:III	18.1	56.8
2009:I	15.7	48.4
2009:III	16.5	53.4

$\$10\text{Trillion} \times 0.04 = \400Billion change in consumption
(or roughly 4%)

- Financial Market Freeze

Date	Ted-Spread	Com. Paper /Tbill Spread	ABS Issuance IABS Bloomberg)
2007 Avg	0.83	0.34	64
12/2007	1.91	0.39	22.1
7/2008	1.13	1.09	17.2
8/2008	1.06	1.04	14.5
9/2008	1.97	1.78	11.9
10/2008	3.37	2.52	0.6
11/2008	2.09	1.35	0.7
12/2008	1.80	1.06	5
1/2009	1.08	0.97	3.9

Other Factors

- Oil Prices (Avg \$65/Barrel in 2006, \$92 by 12/07, \$133 by 6/08 ... falls to \$39 by 2/09)
- Uncertainty (Implied Volatility from SP500 triples from 9/09 to 10/09)
- Fed Funds (3.0% in 6/05, to 4.25% 12/06, to 5.25% in 7/07)

A Standard Framework:

$$Y_t = A(L) \varepsilon_t$$

Questions:

1. Which shocks were important for the 2008-09 recession?
2. Were these shocks important in earlier episodes?
3. Was there a change in the dynamic effect of the shocks on Y ?

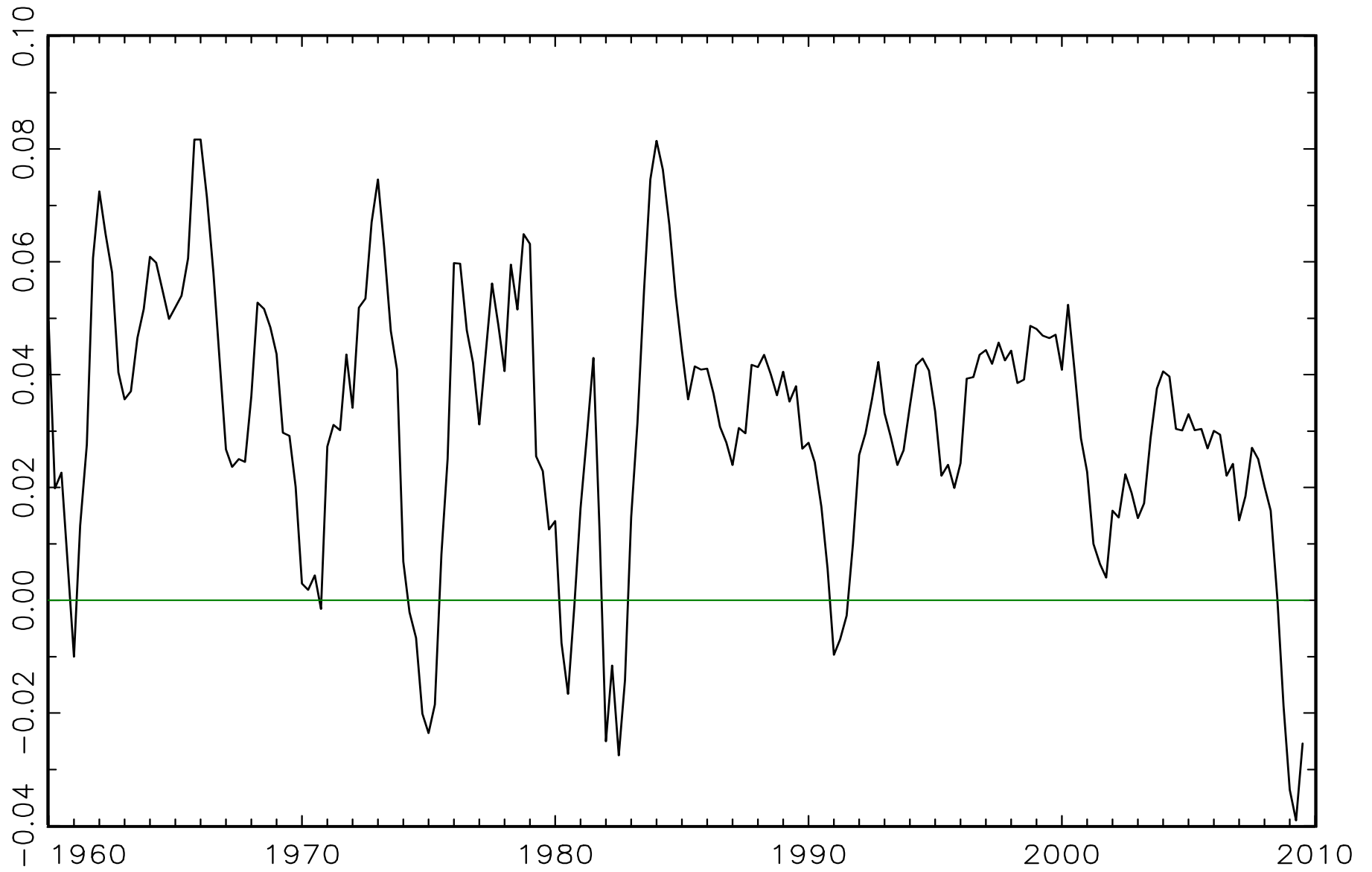
Econometric Framework: Large n, T dynamic factor model

$$Y_t = \Lambda(L)\eta_t + u_t$$

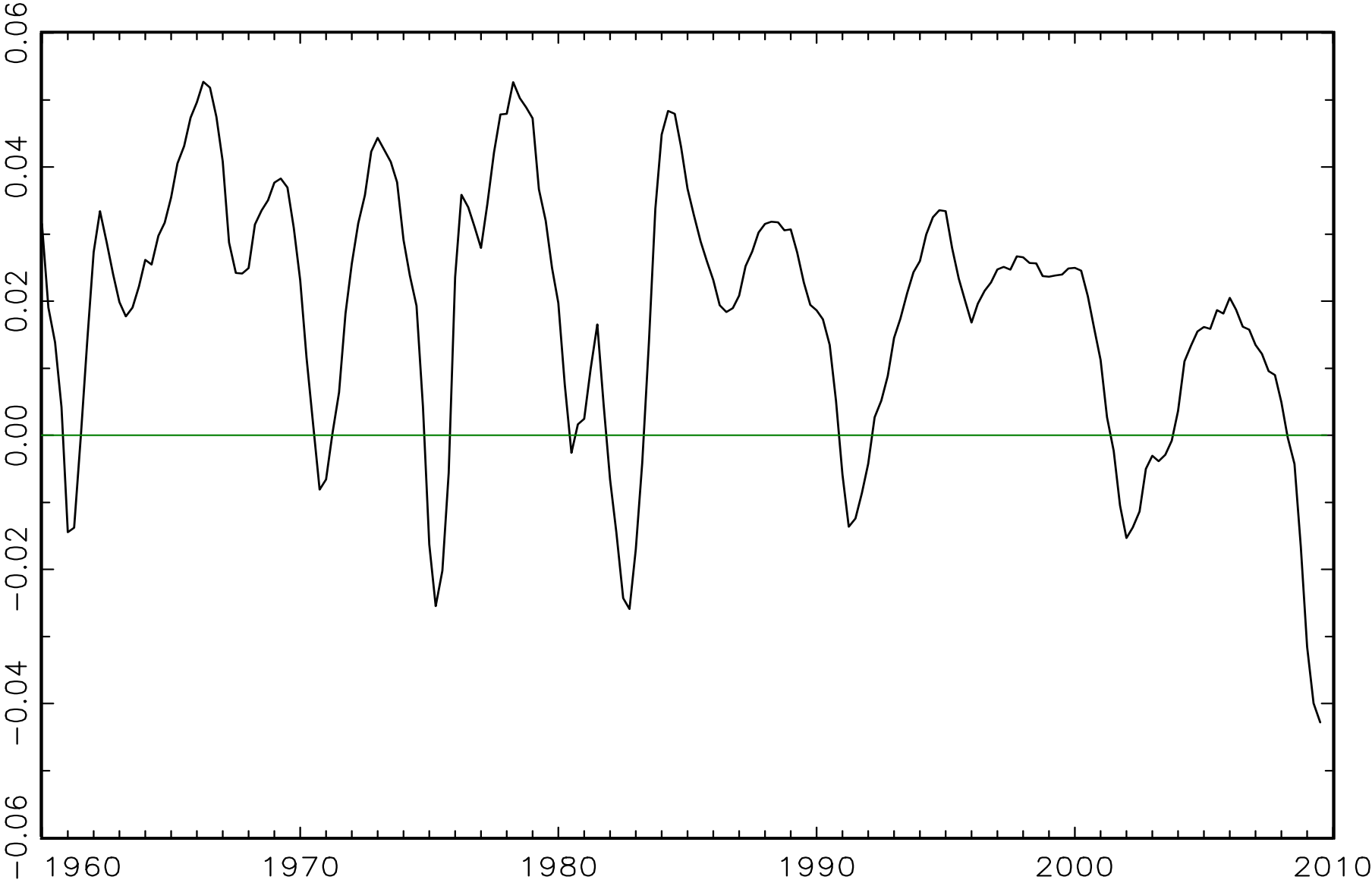
1. Is 2008-09 associated with the same common shocks η_t that have been important in the past? Or, are new common or idiosyncratic shocks needed to explain 2008-09?
2. Did $\Lambda(L)$ change?
3. Can the important shocks be associated standard channels (wealth effects, oil prices, credit, etc.) ?

A Quick Look at Some Data

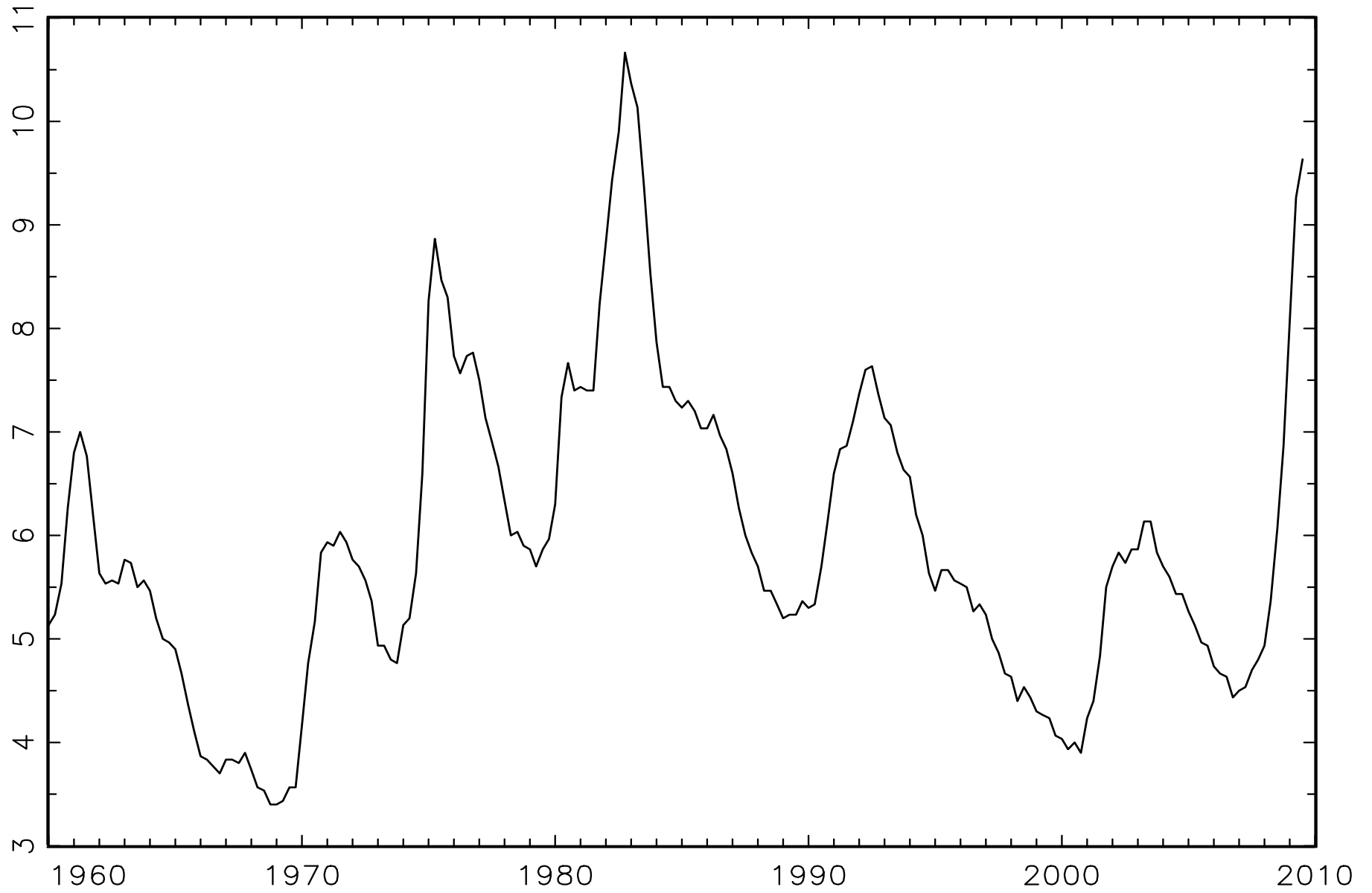
GDP 4-Quarter Growth Rates



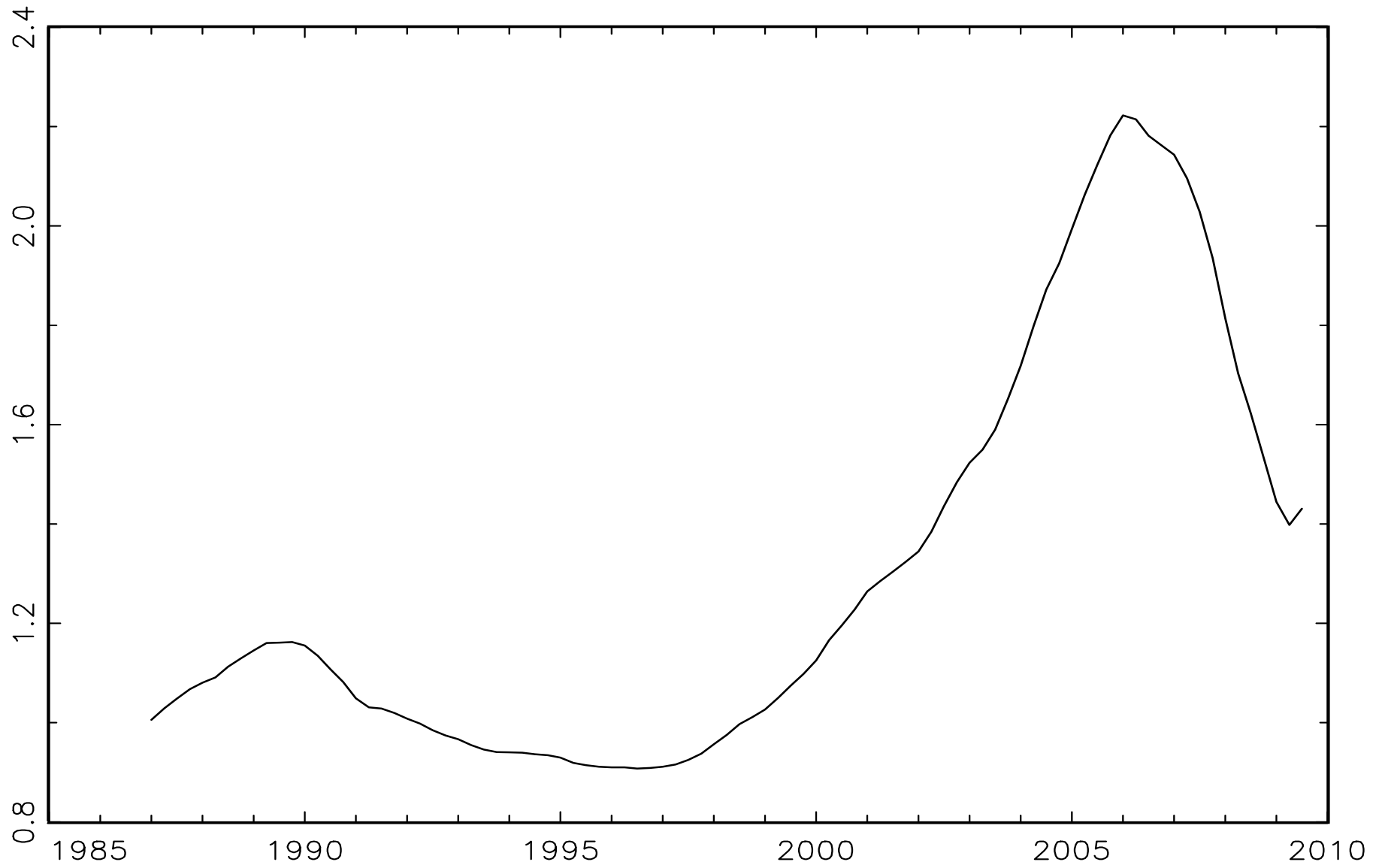
Employment 4-Quarter Growth Rates



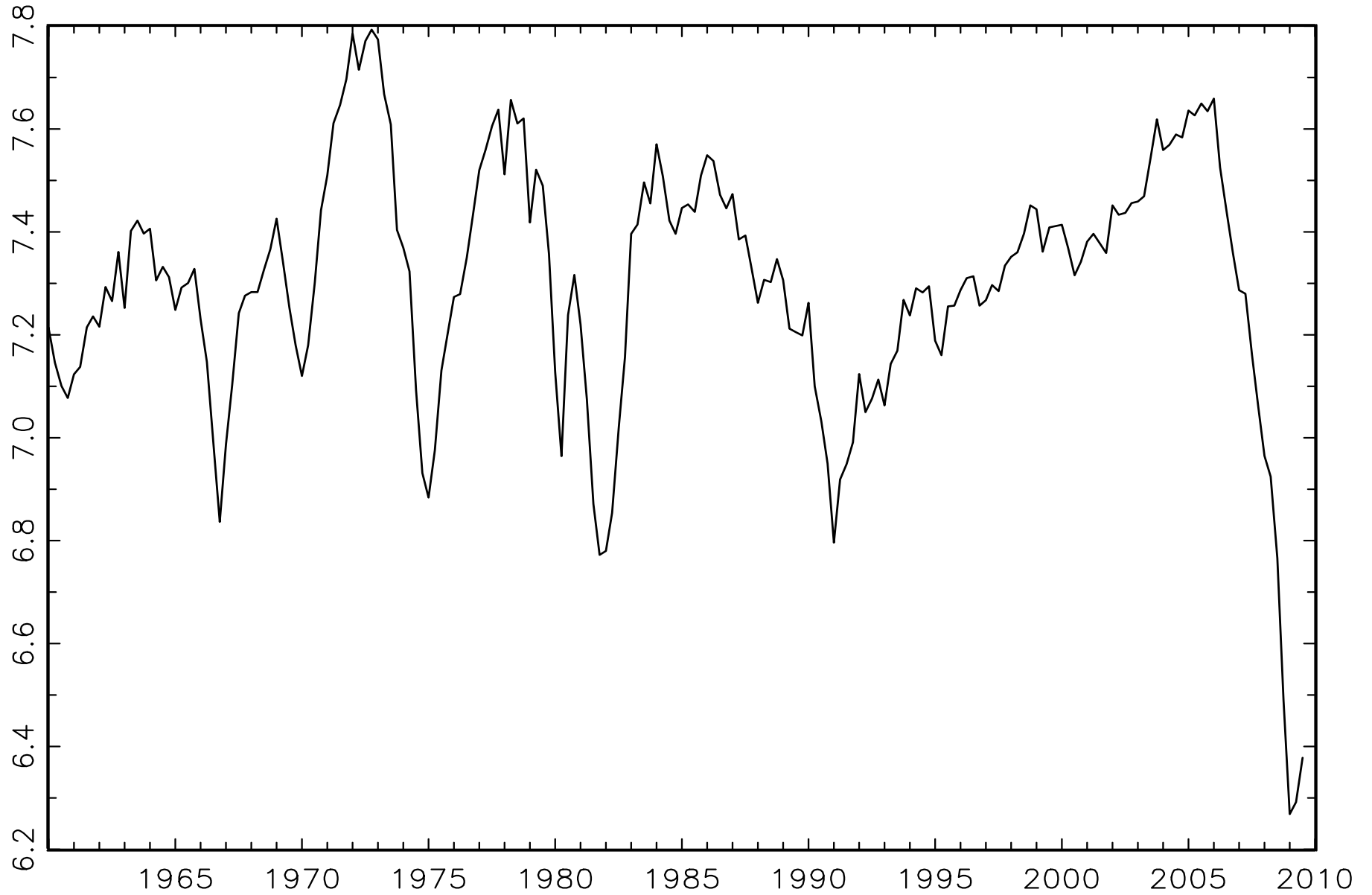
Unemployment Rate



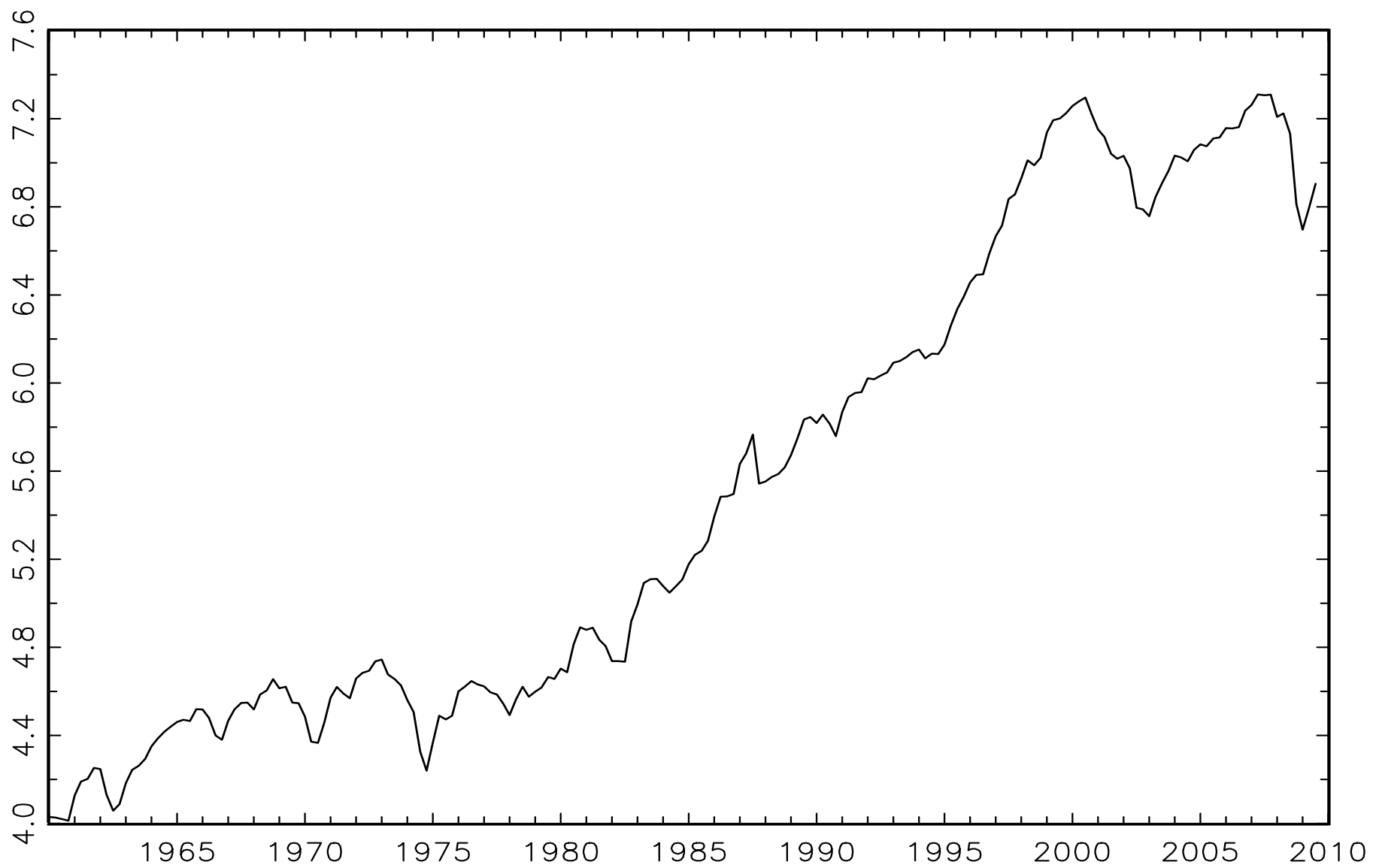
Housing Prices (CS-10-City)



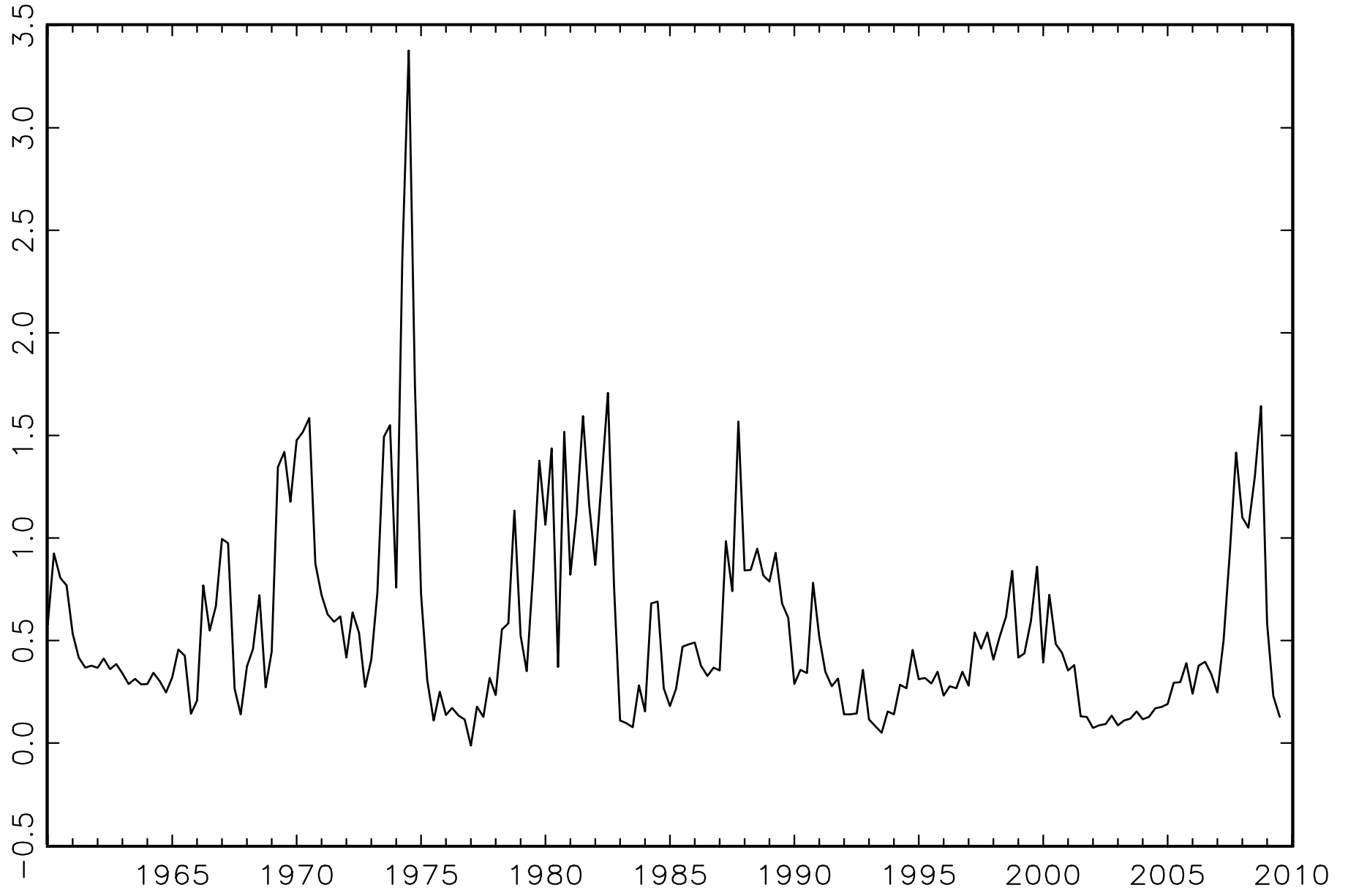
Housing Starts (Logarithm)



SP Composite Index (Logarithm)



Com. Paper – Tbill Spread



Econometric Model

DFM: $Y_{it} = \lambda_i' F_t + u_{it}$

$$\Phi(L)F_t = H\eta_t$$

Unbalanced Panel:

Total Series = 187 Series

130 Used for Factor Estimation

57 Additional Series

Full Sample Period: 1959:1 – 2009:3

List Series (Categories, and so forth)

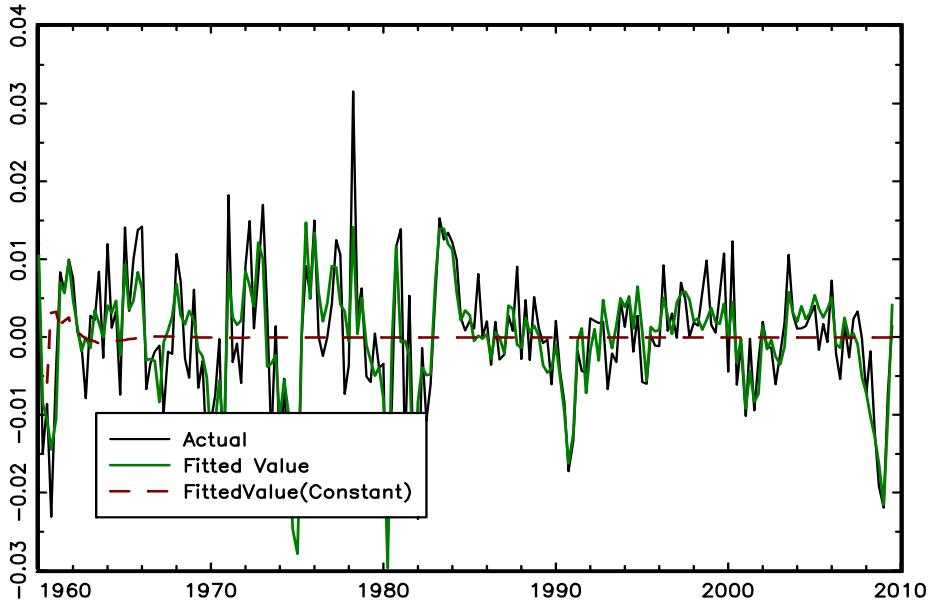
Category	Number of Series
Real NIPA flows	20
Industrial Production	12
Employment/Unemployment	43
Housing Starts	7
Orders/Inv/Sales	8
Prices	36
Earning/Productivity	11
Int. Rates	14
Money&Credit	11
StockPrices&Wealth	12
Housing Prices	4
Exchange Rates	5
Other	1

Question 1: Is 2008-09 associated with the same common shocks η_t that have been important in the past? Or, are new common or idiosyncratic shocks needed to explain 2008-09?

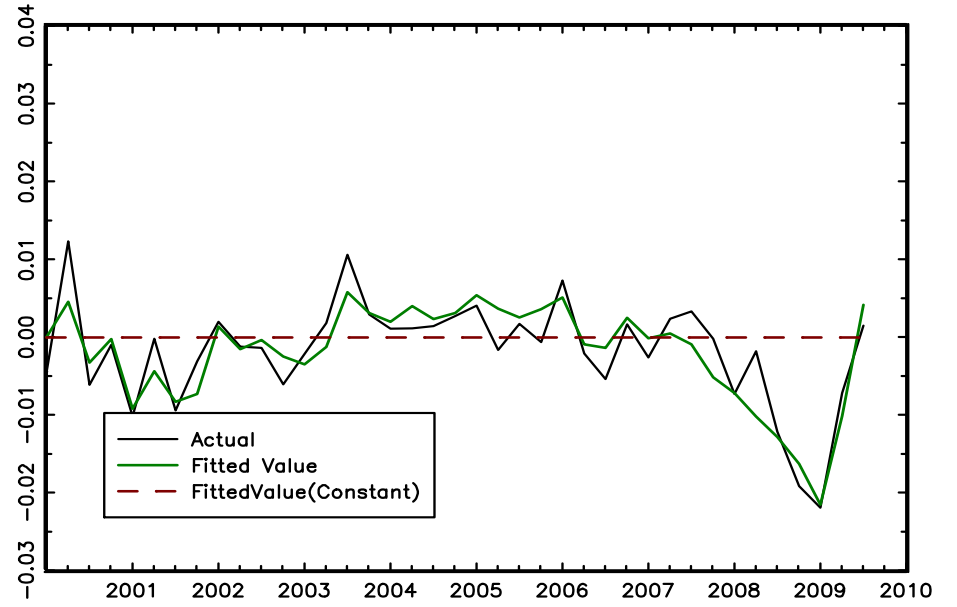
$$X_{it} = \lambda_i' F_t + u_{it}$$

(a) Are the u_{it} shocks unusually large in this recession?

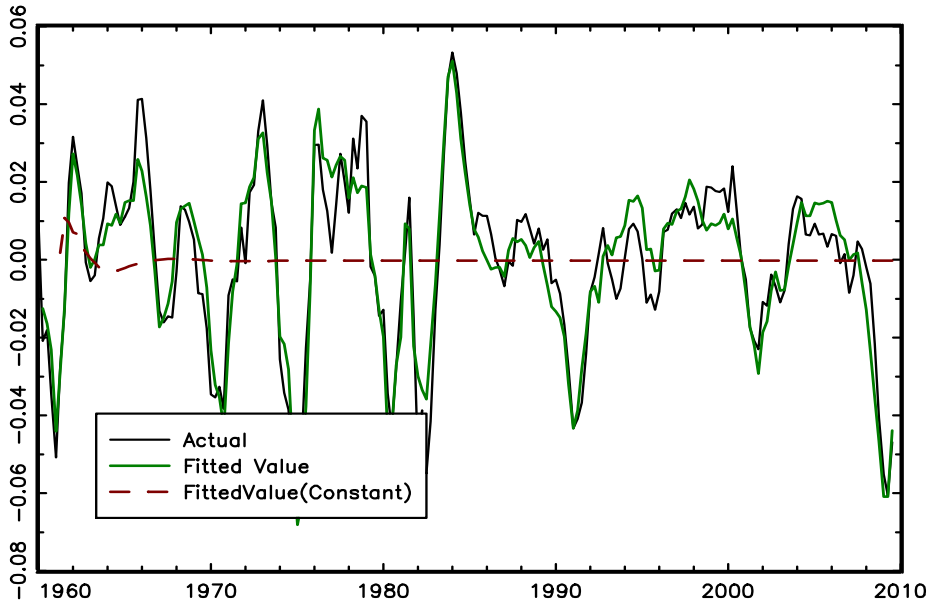
GDP



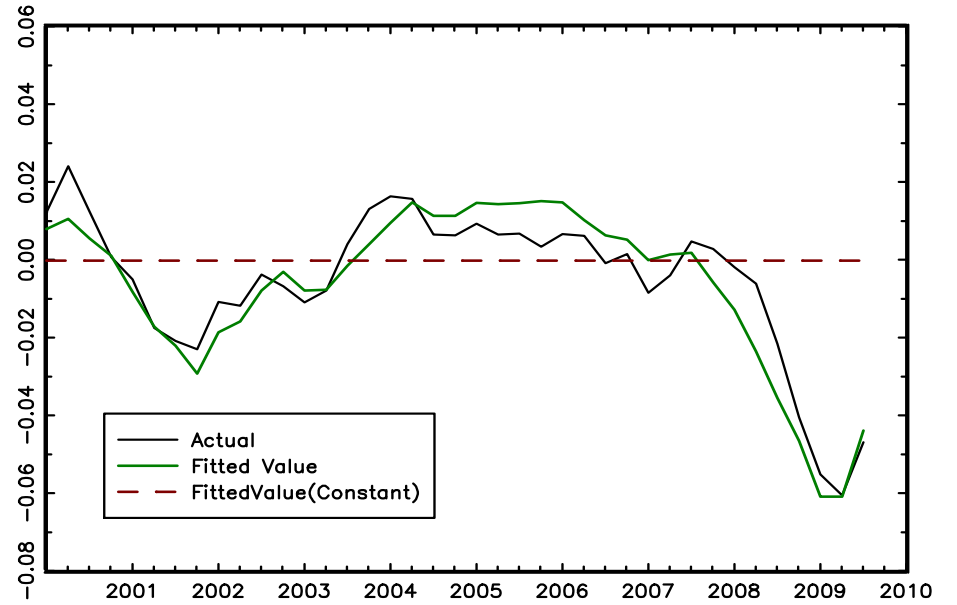
GDP



Year-Over-Year

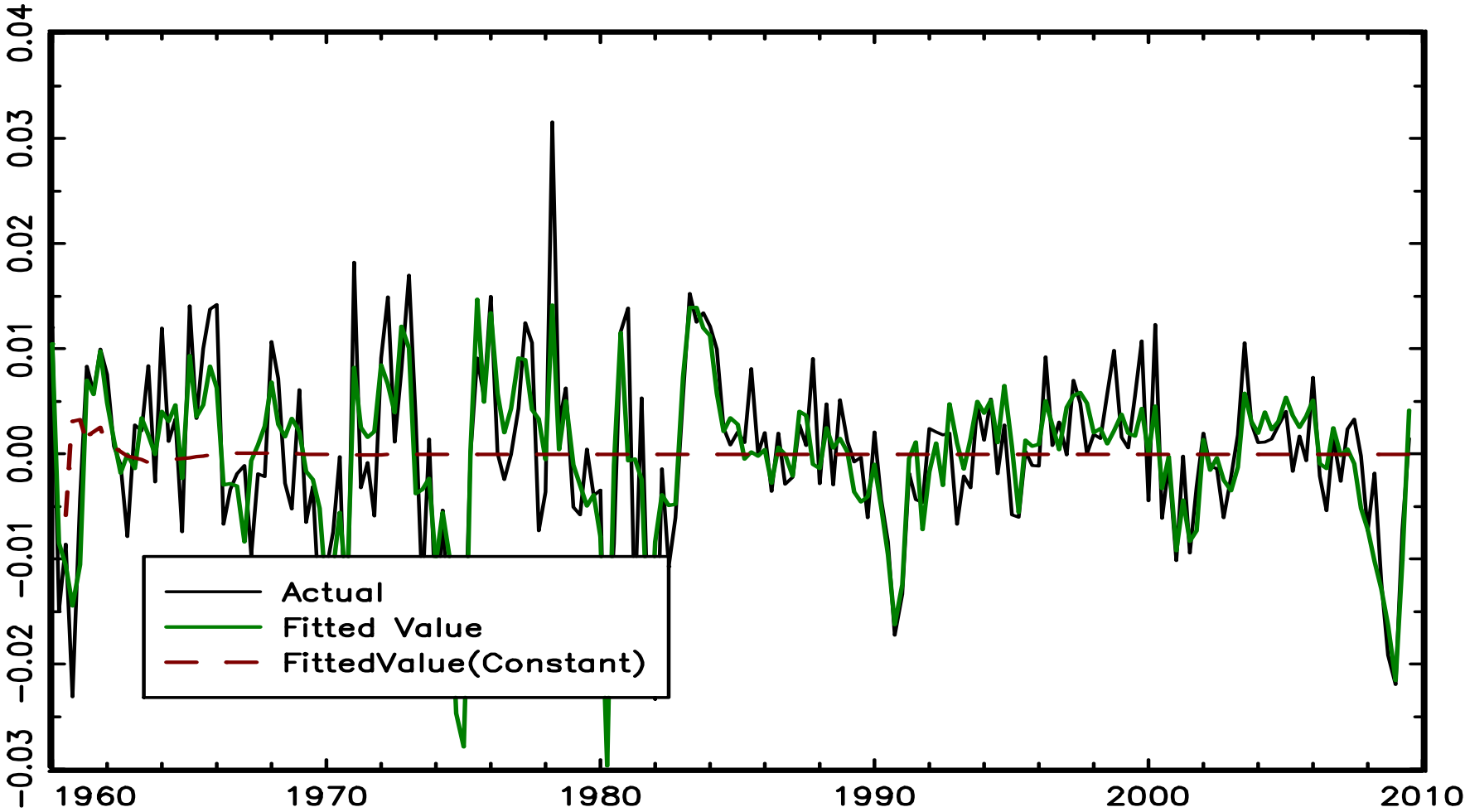


Year-Over-Year



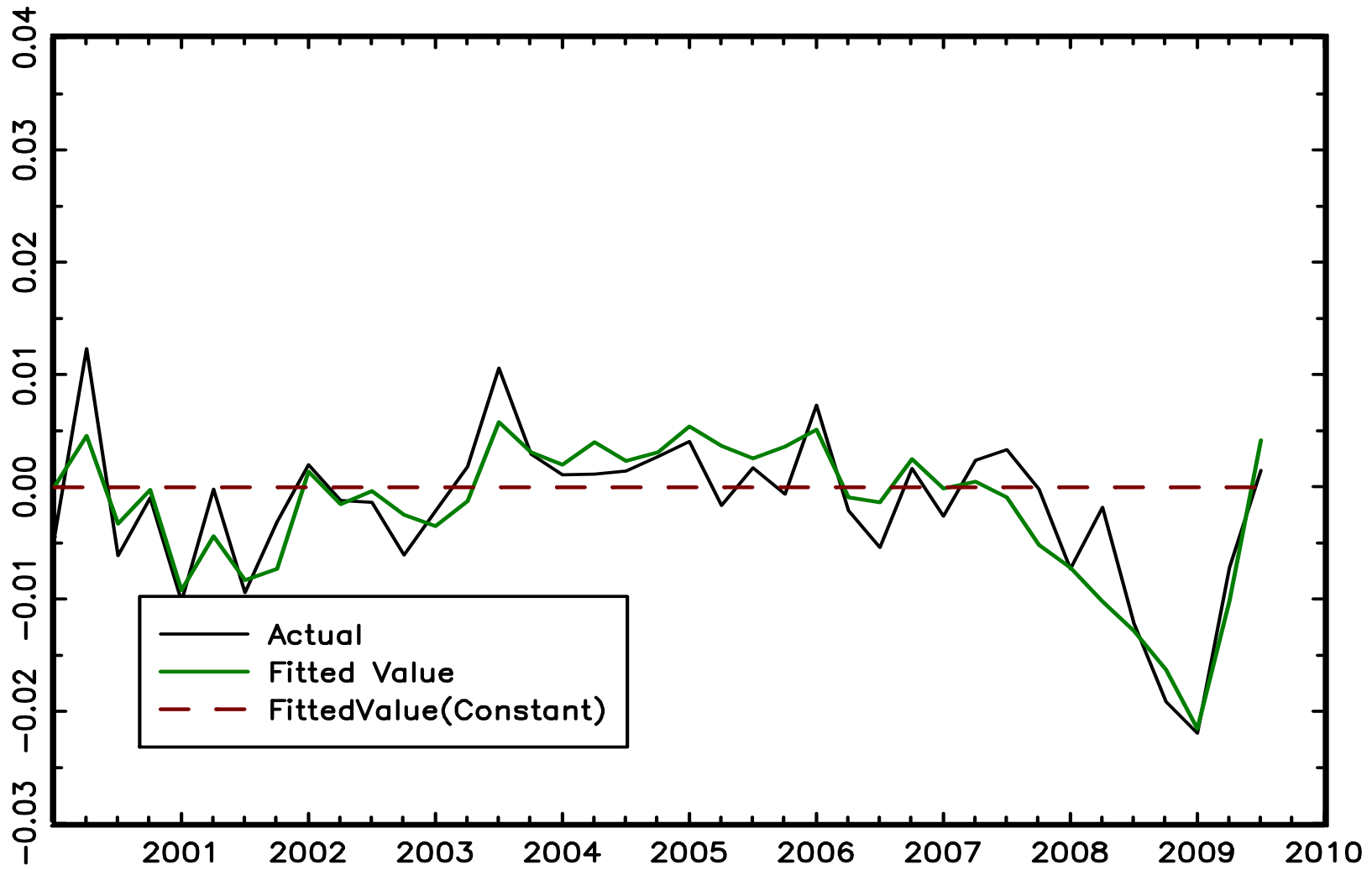
First Differences (full sample)

GDP

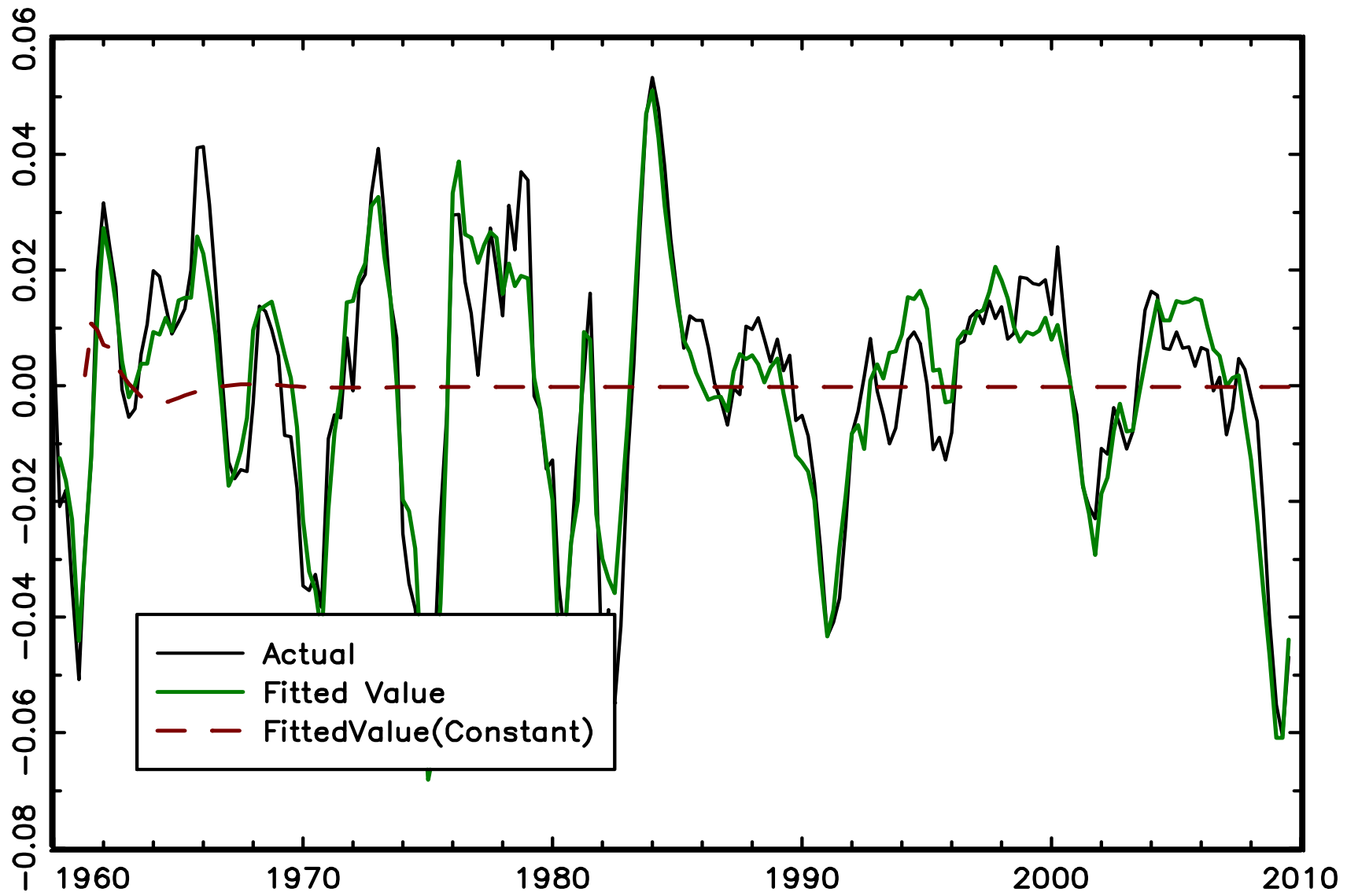


First Differences (2000-2009)

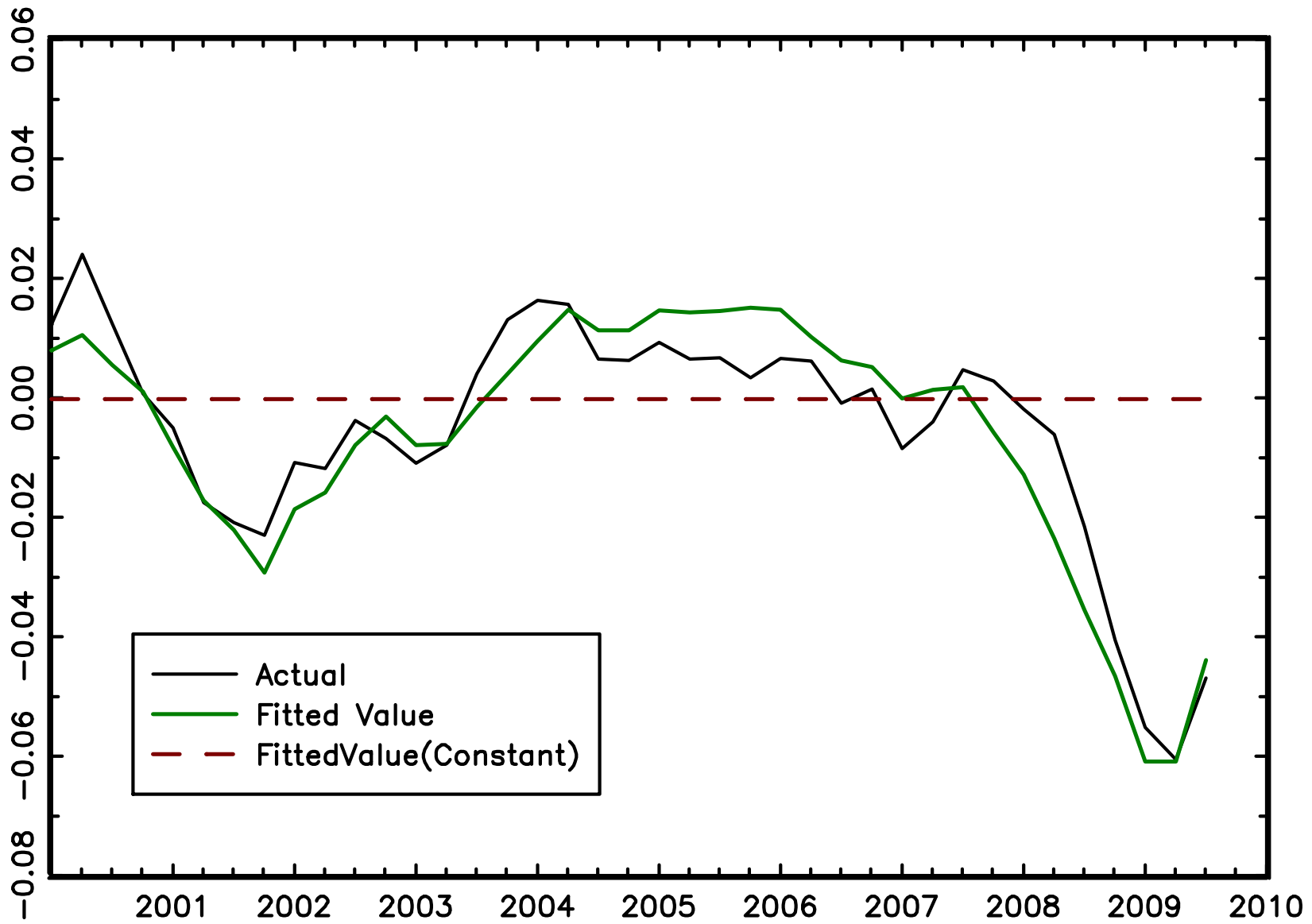
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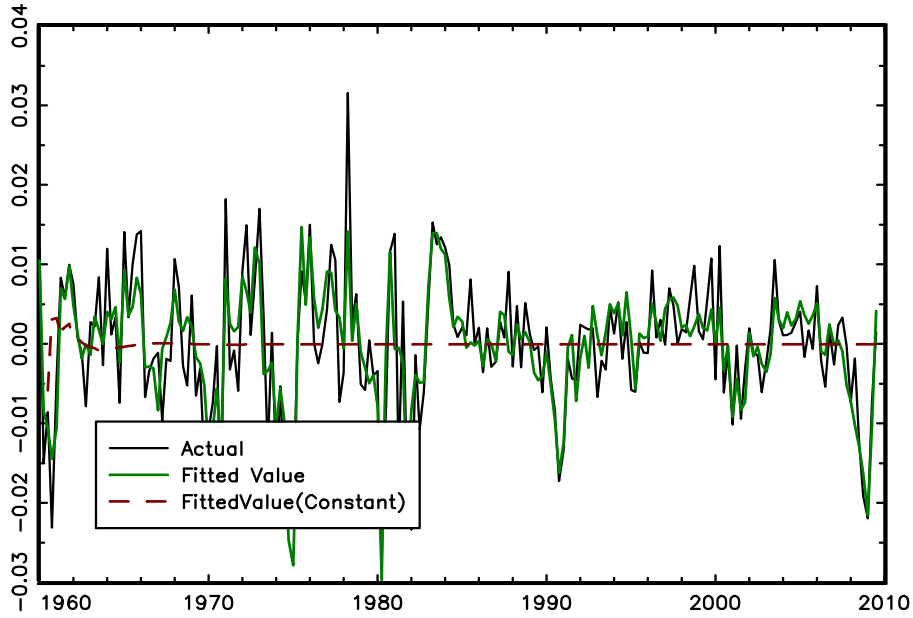
Year-over-Year Changes (Full Sample)



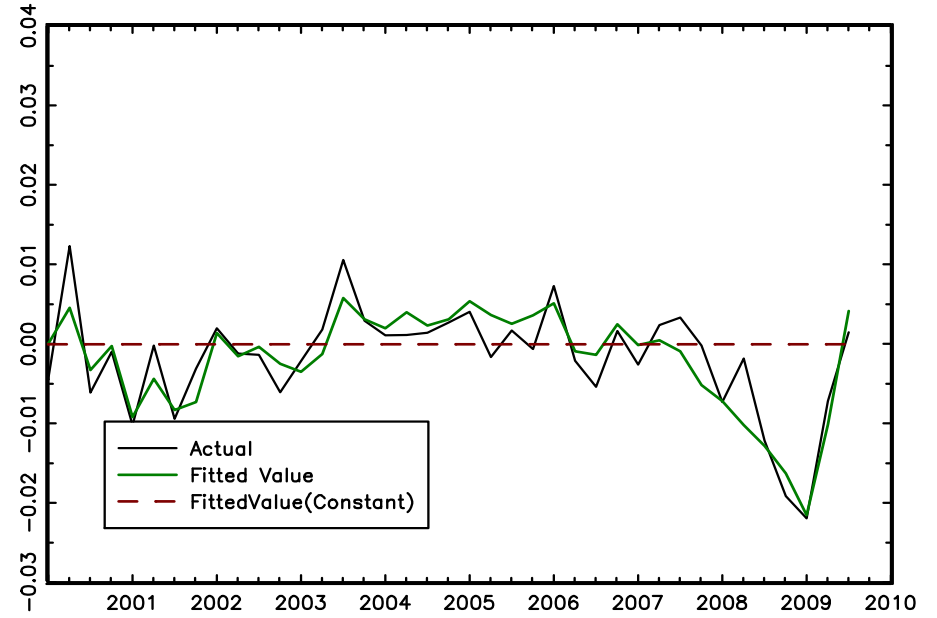
Year-over-Year Changes (2000-2009)



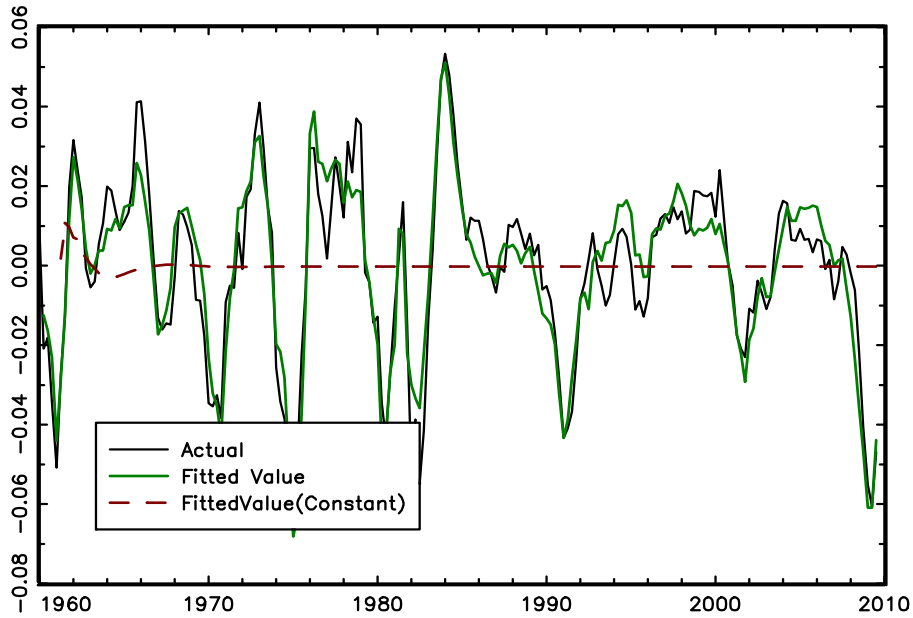
GDP



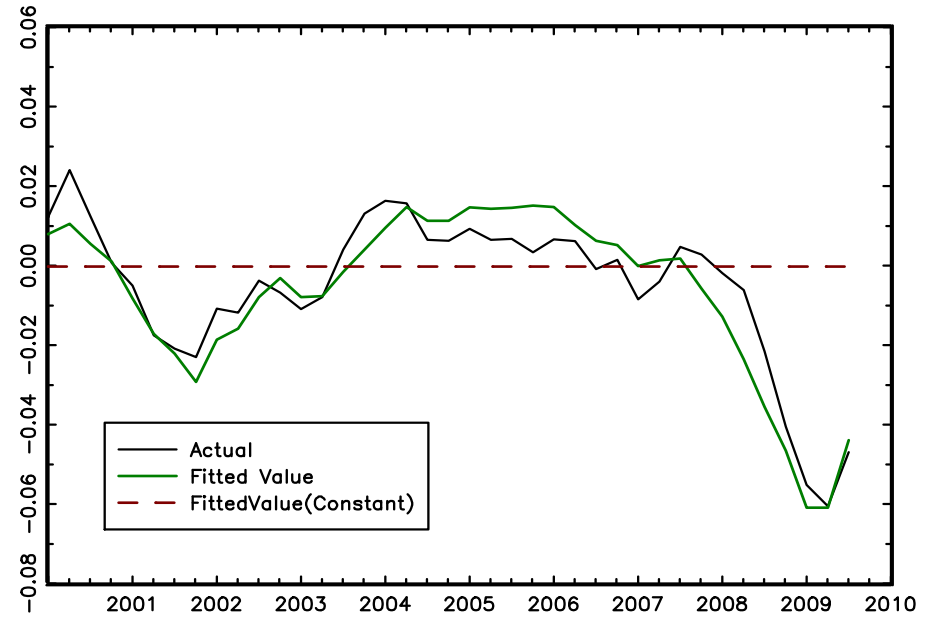
GDP



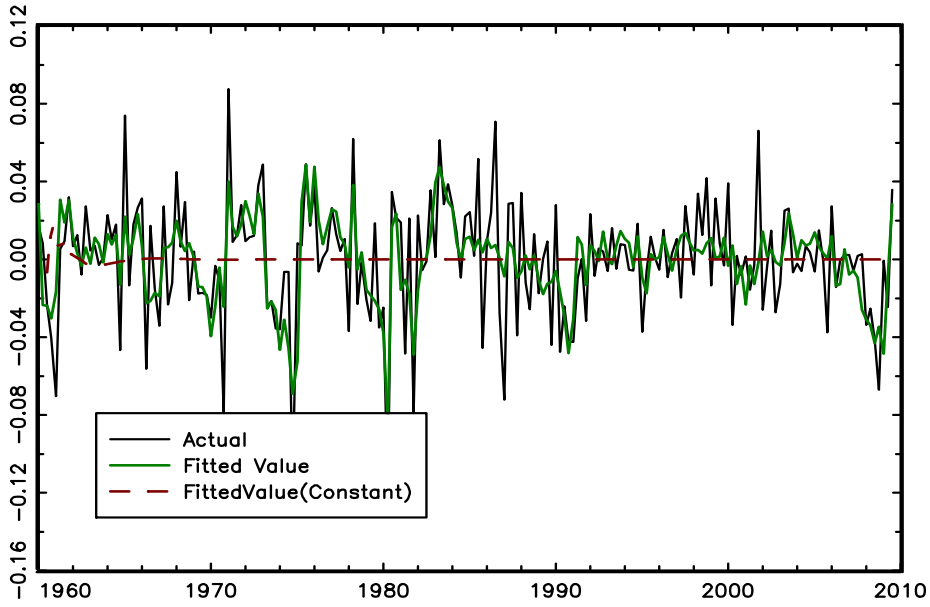
Year-Over-Year



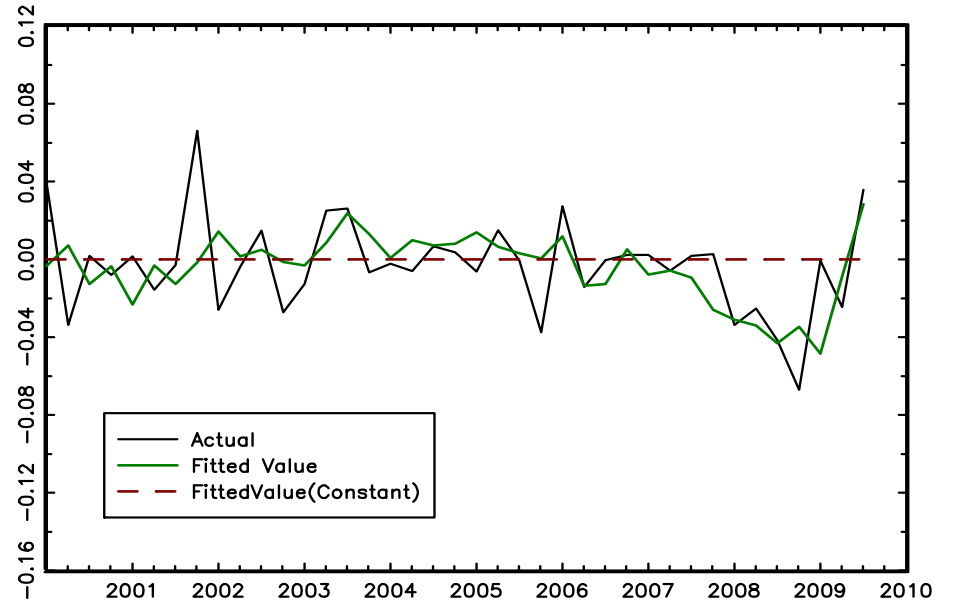
Year-Over-Year



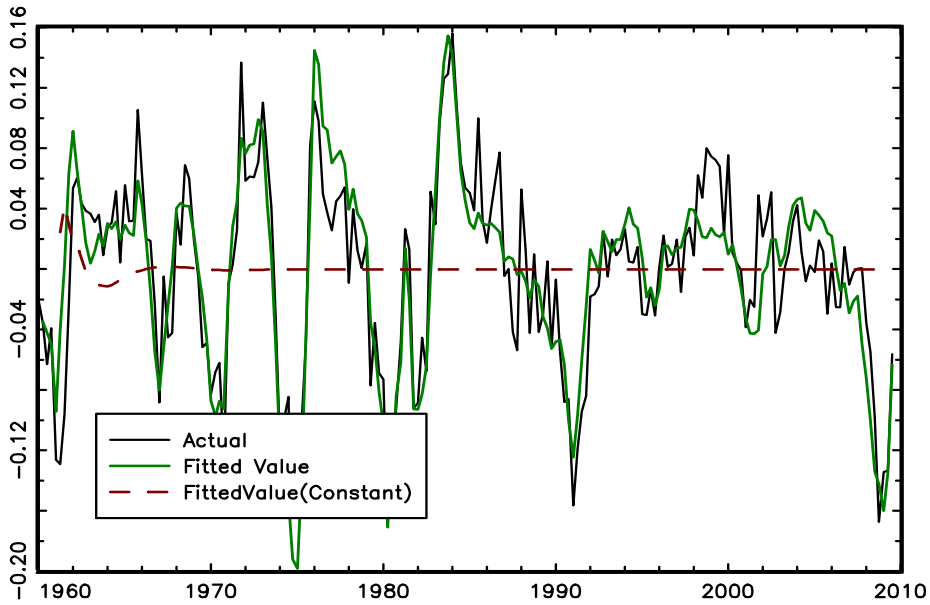
Cons:Dur



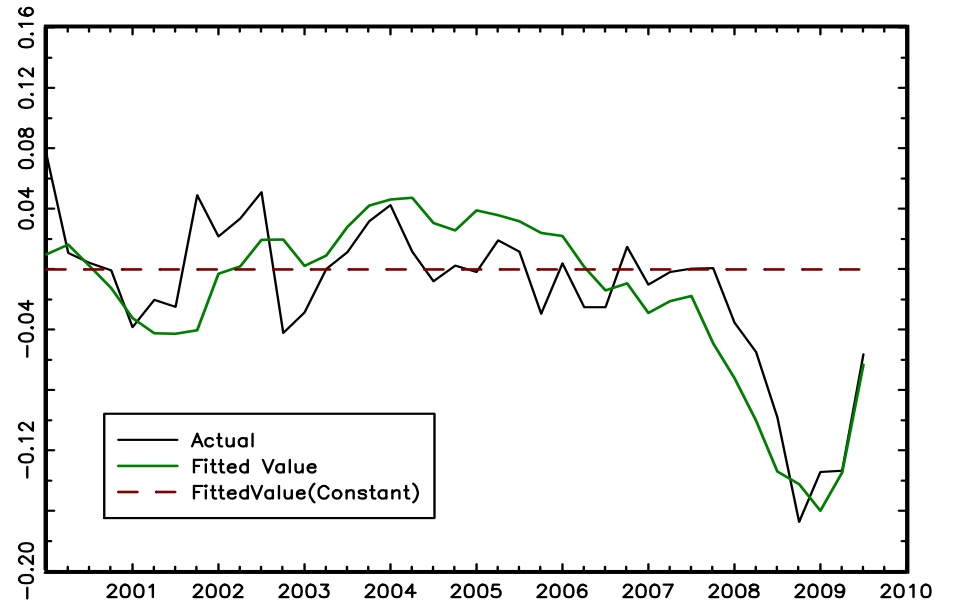
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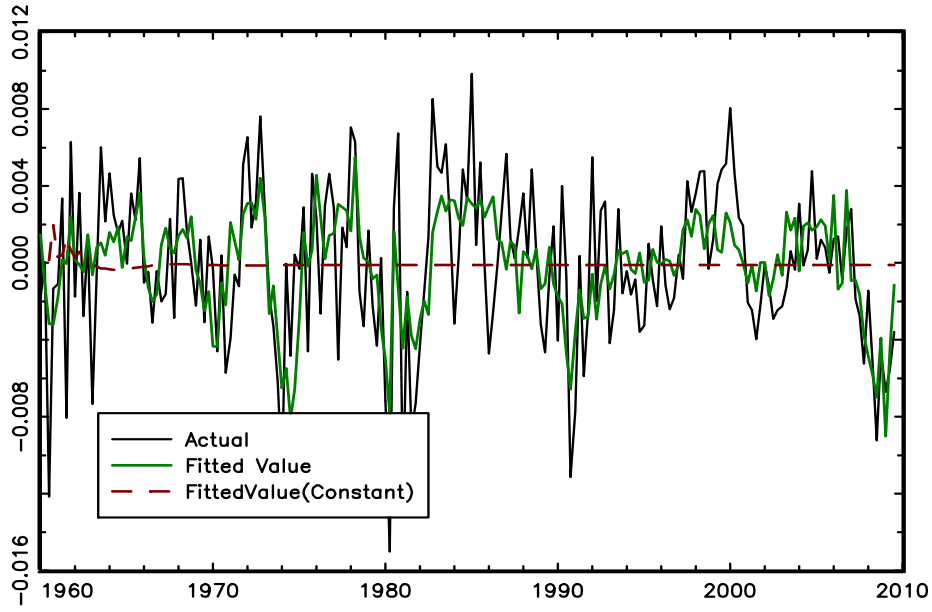
Year-Over-Year



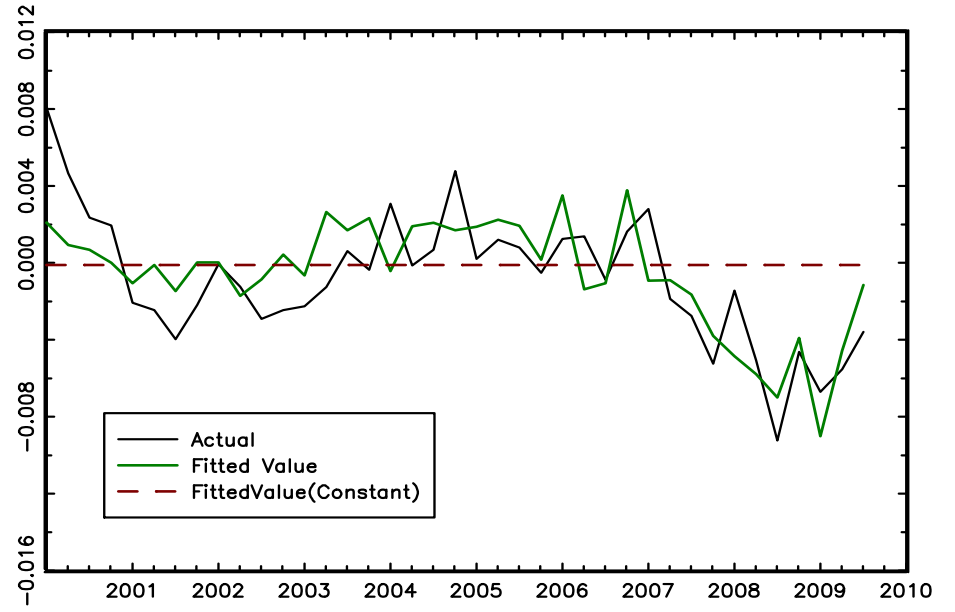
Year-Over-Year



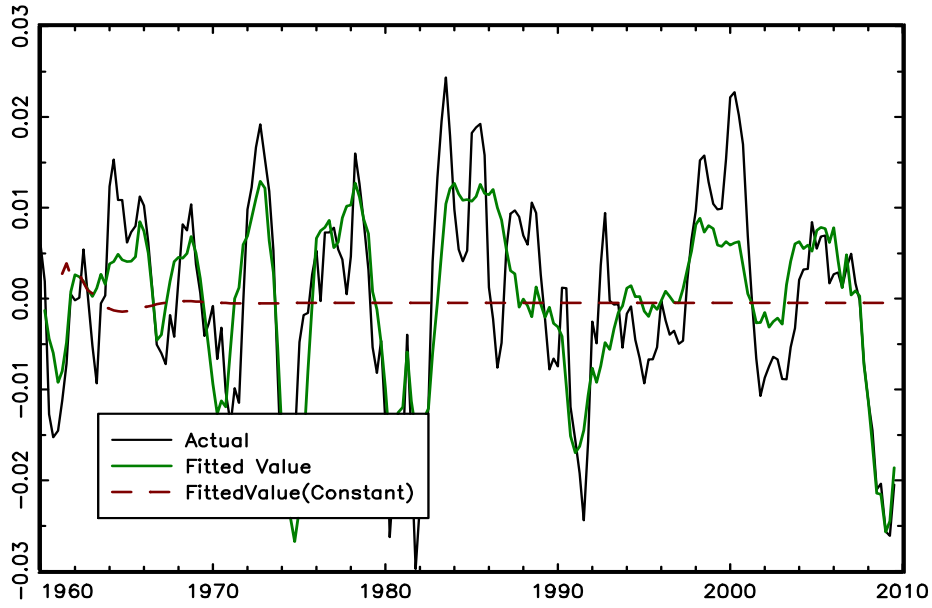
Cons:Svc



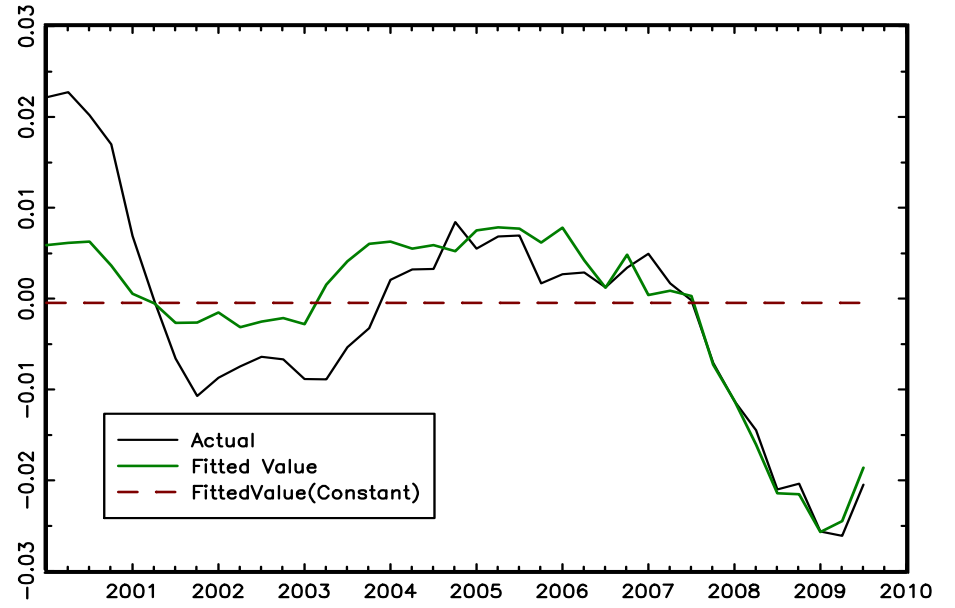
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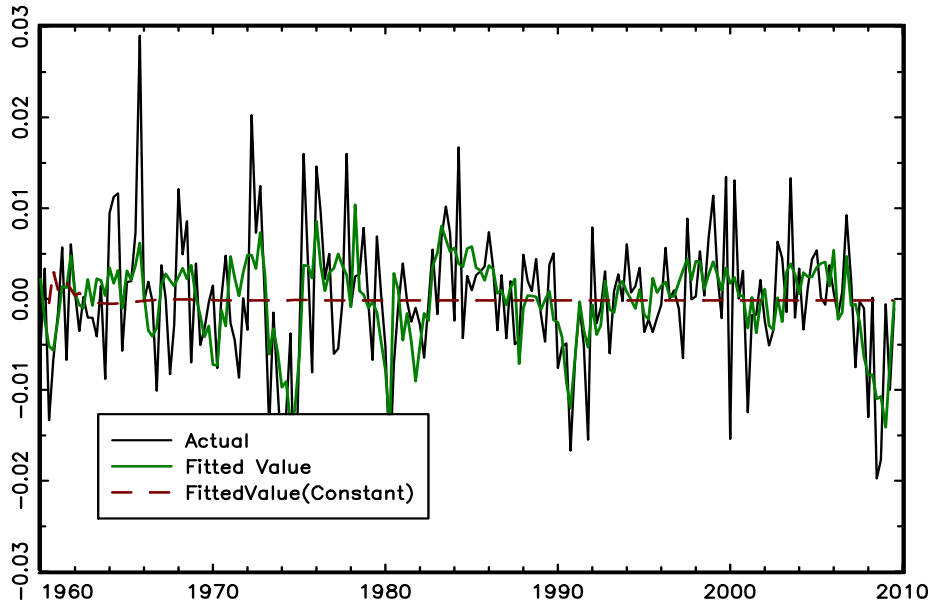
Year-Over-Year



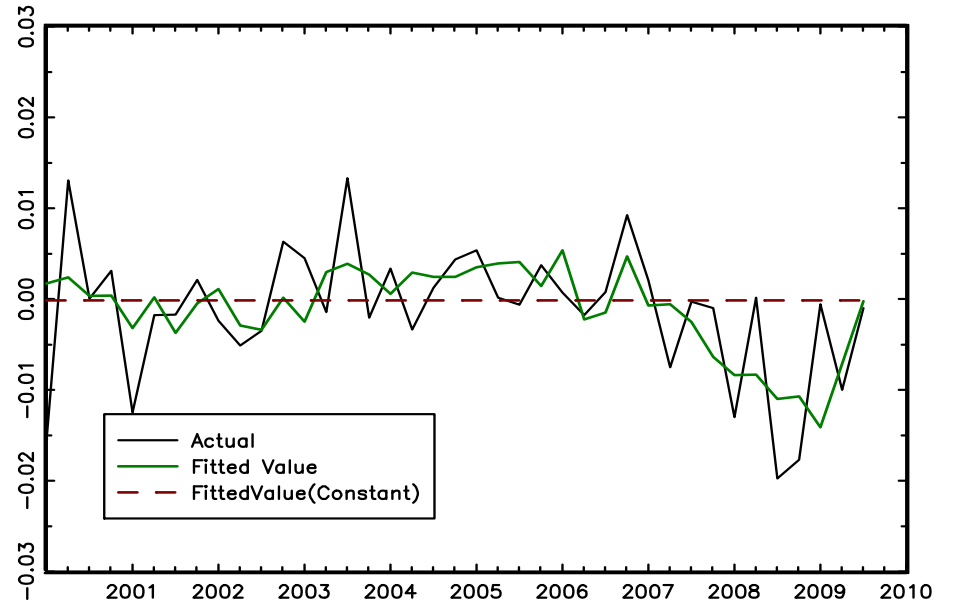
Year-Over-Year



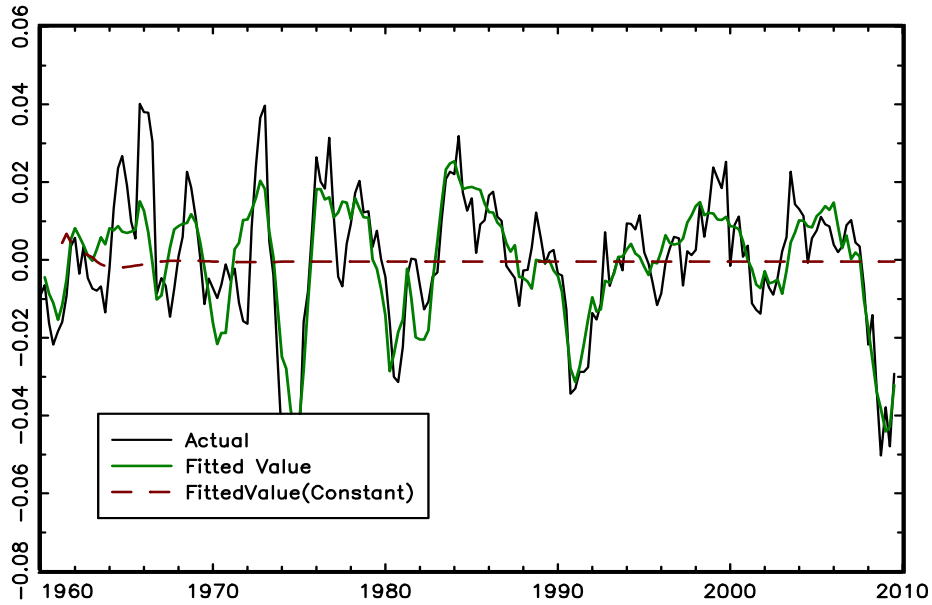
Cons:NonDur



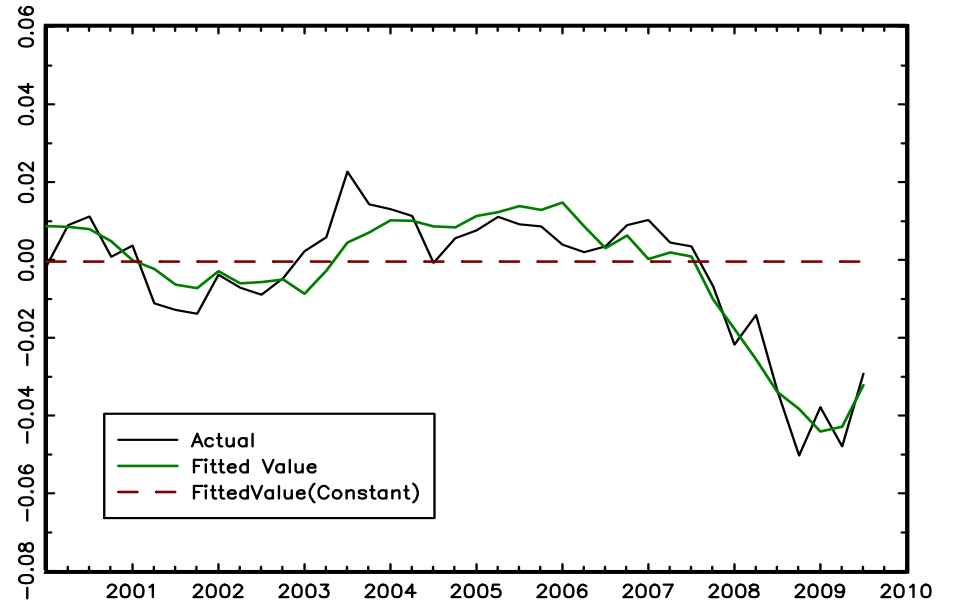
Cons:NonDur



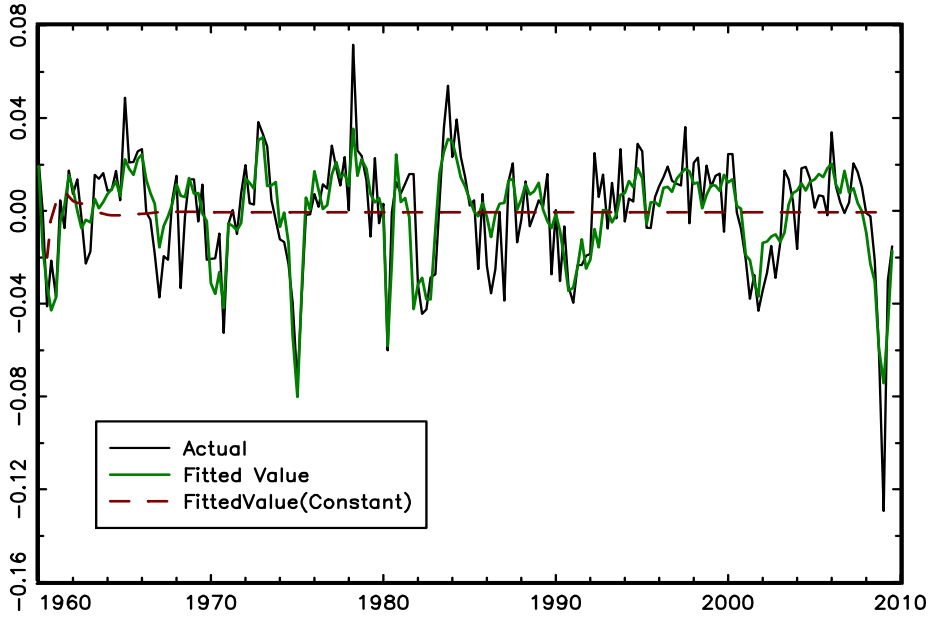
Year-Over-Year



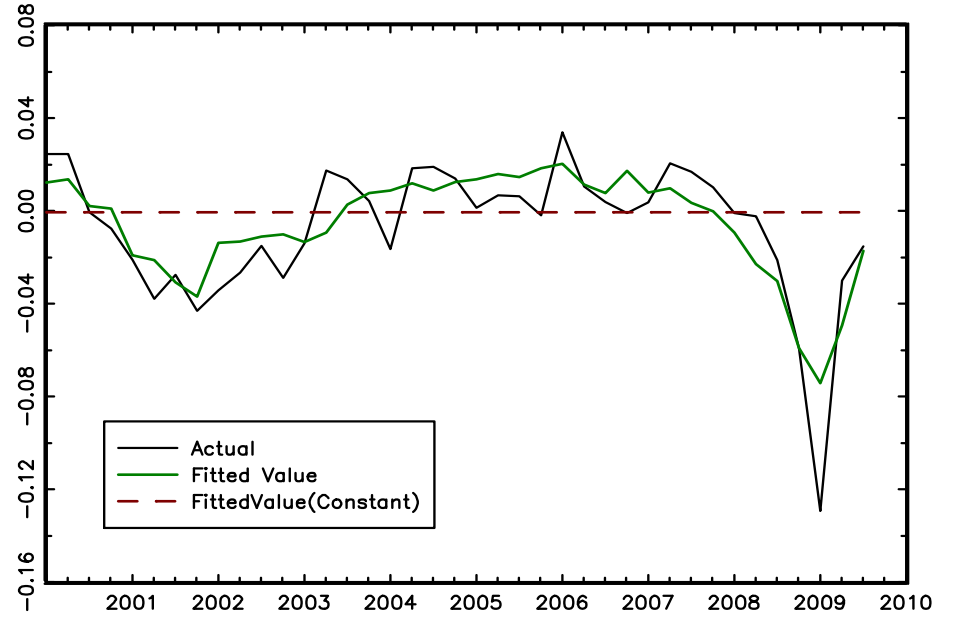
Year-Over-Year



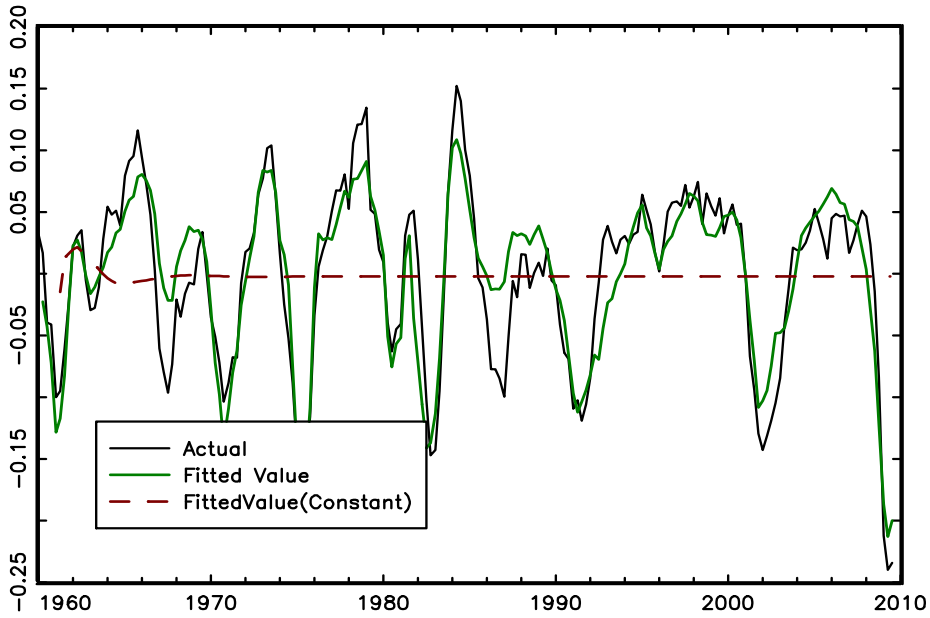
FixInv:NonRes



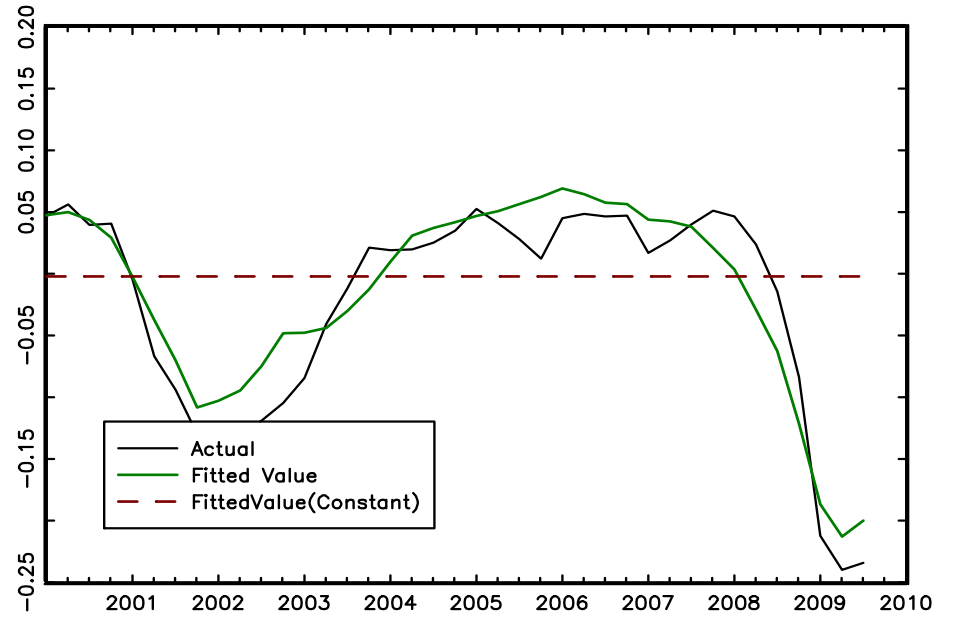
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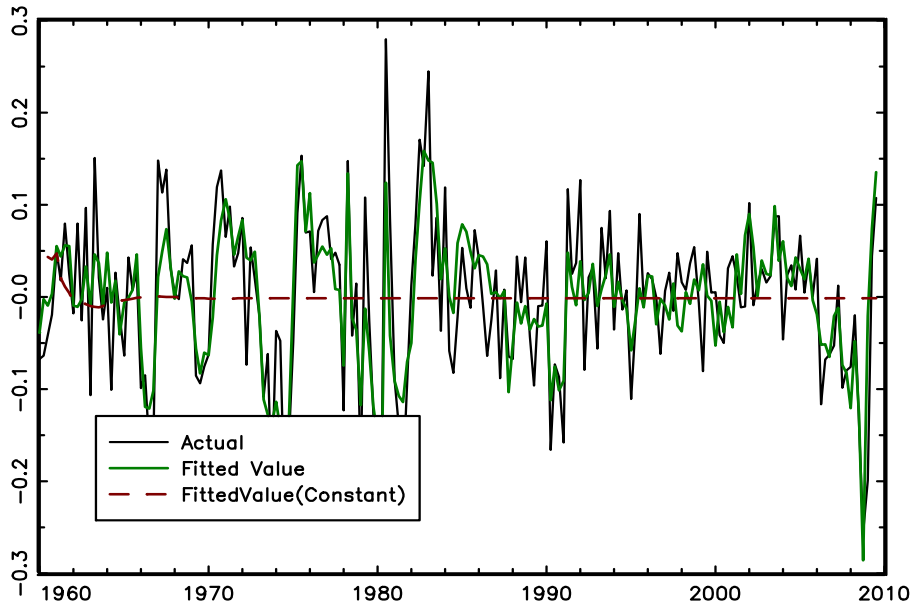
Year-Over-Year



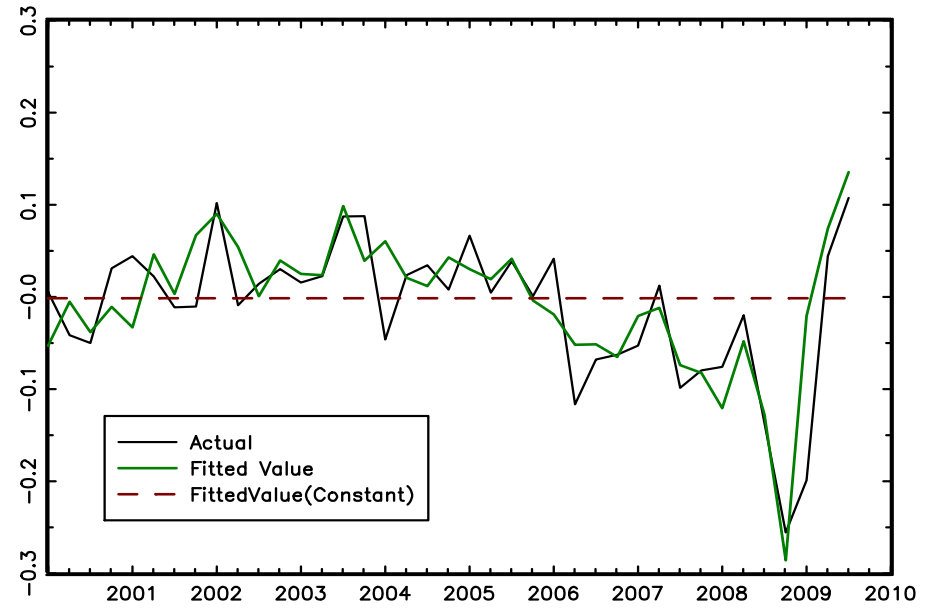
Year-Over-Year



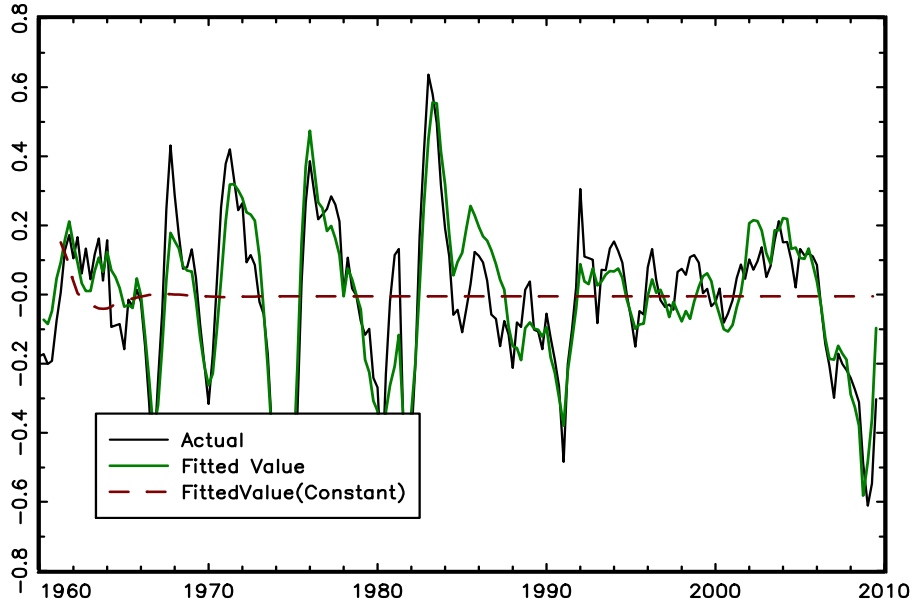
Hstarts



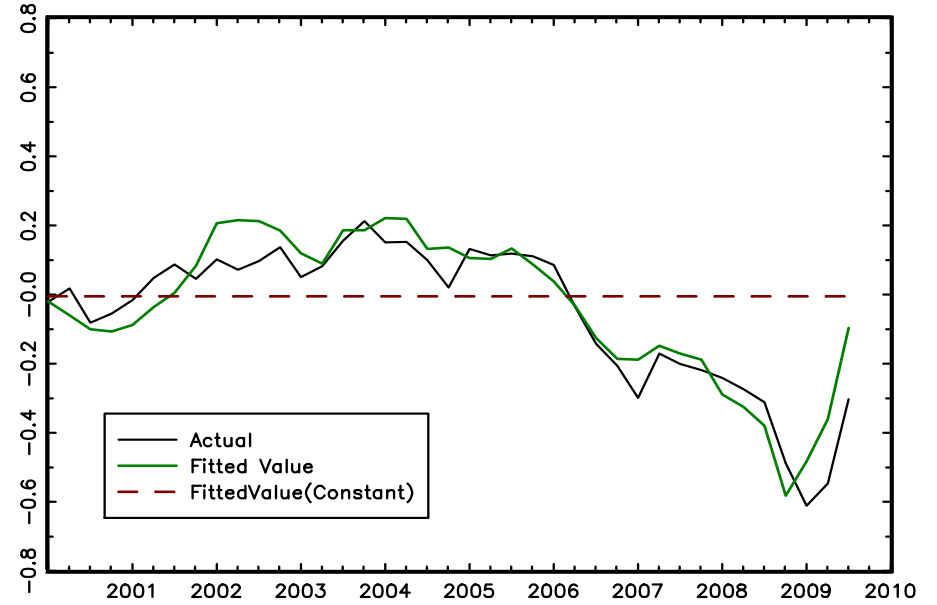
Hstarts



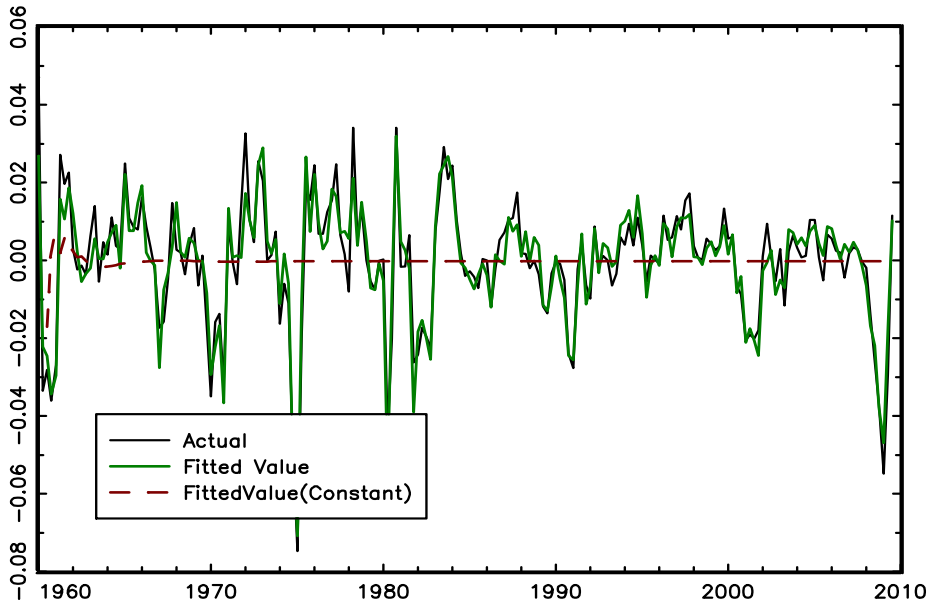
Year-Over-Year



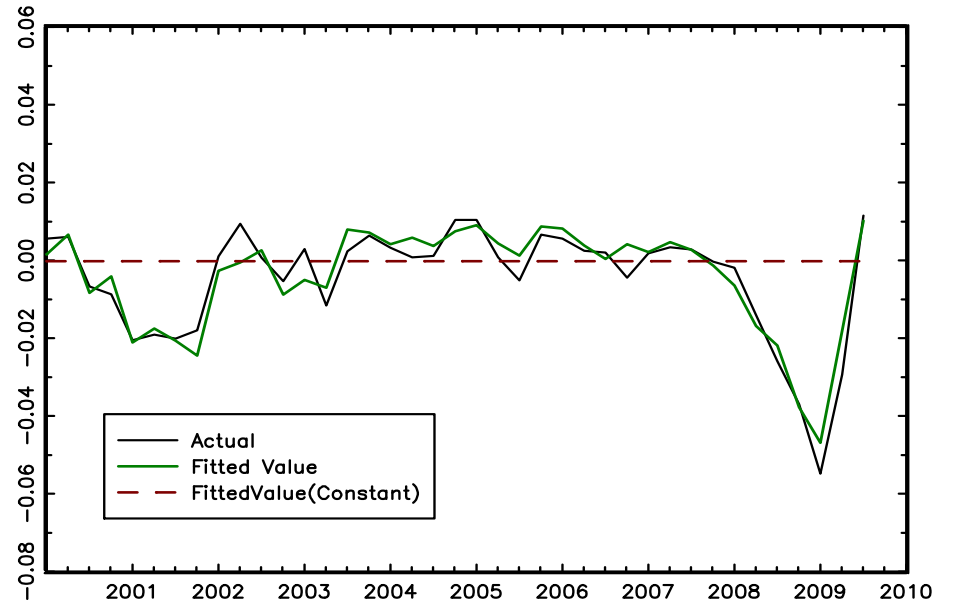
Year-Over-Year



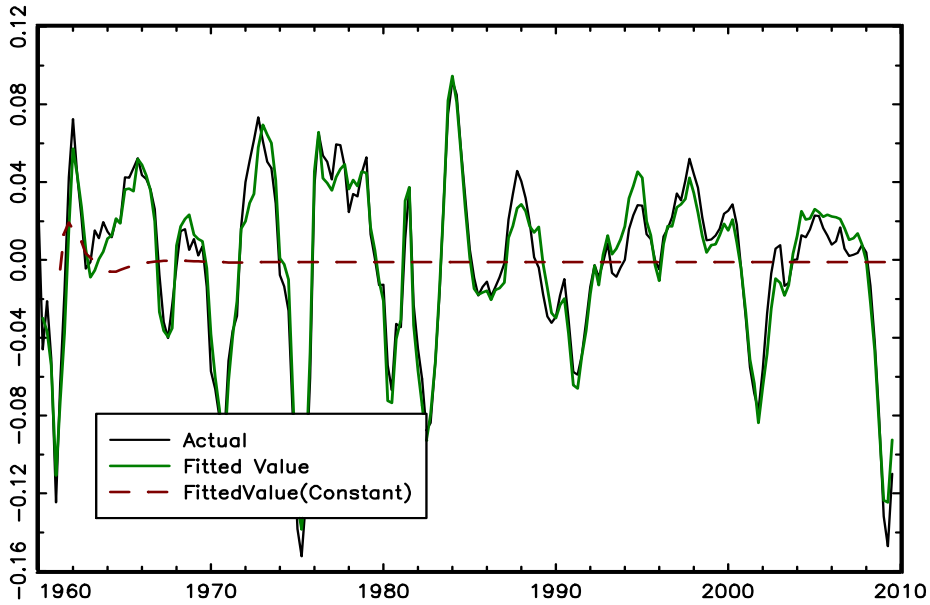
IP: Total index



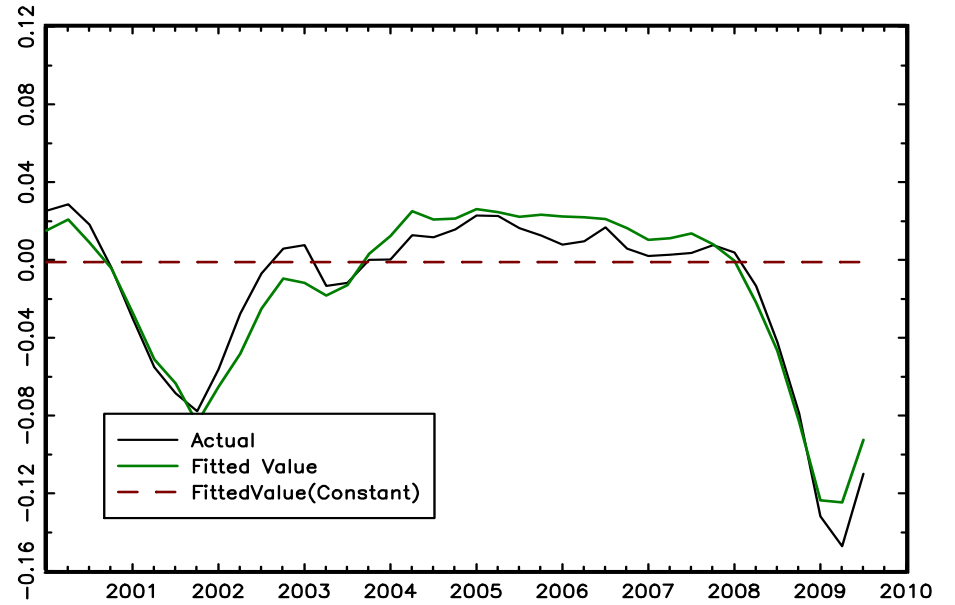
IP: Total index



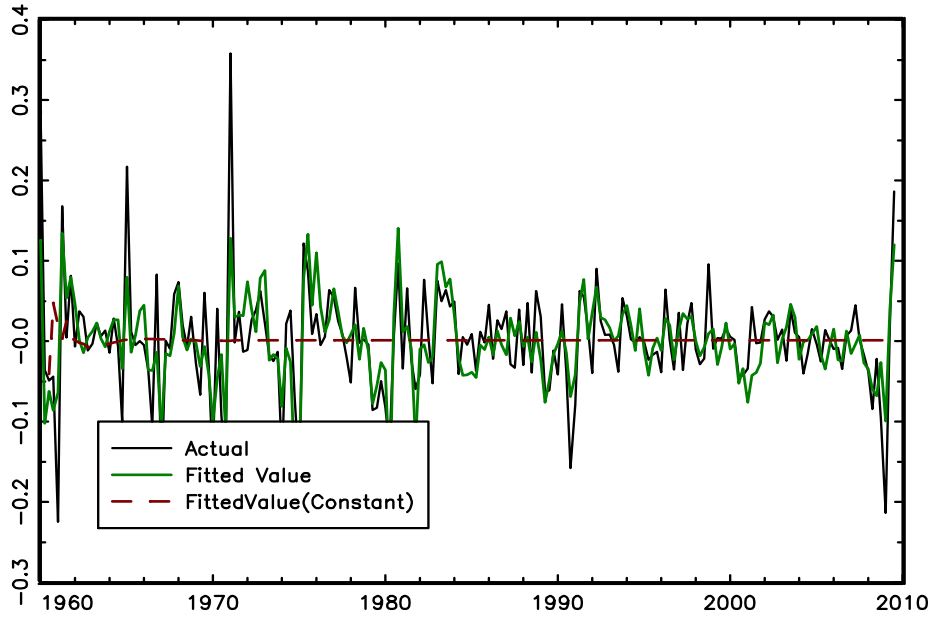
Year-Over-Year



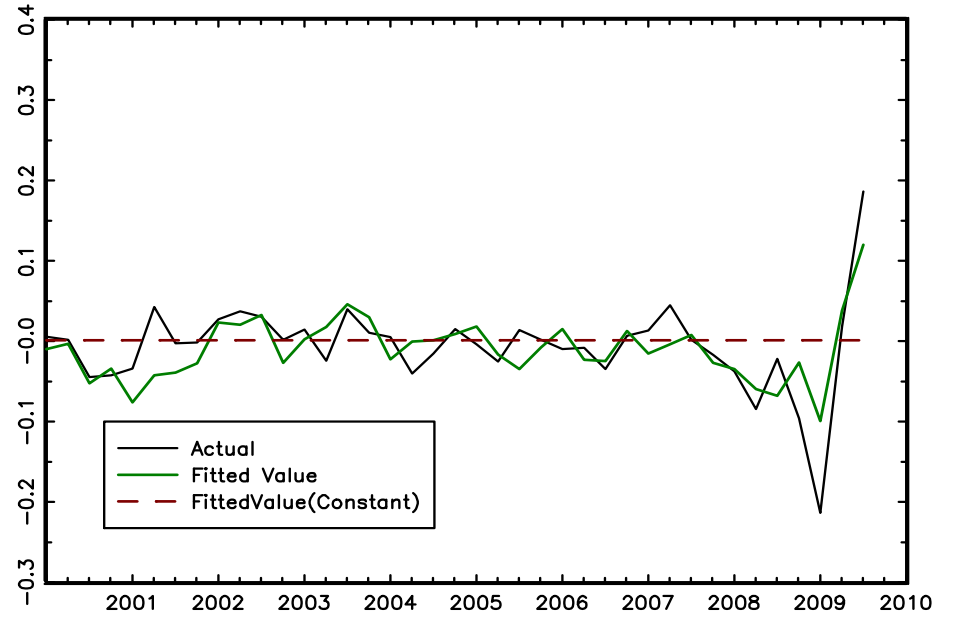
Year-Over-Year



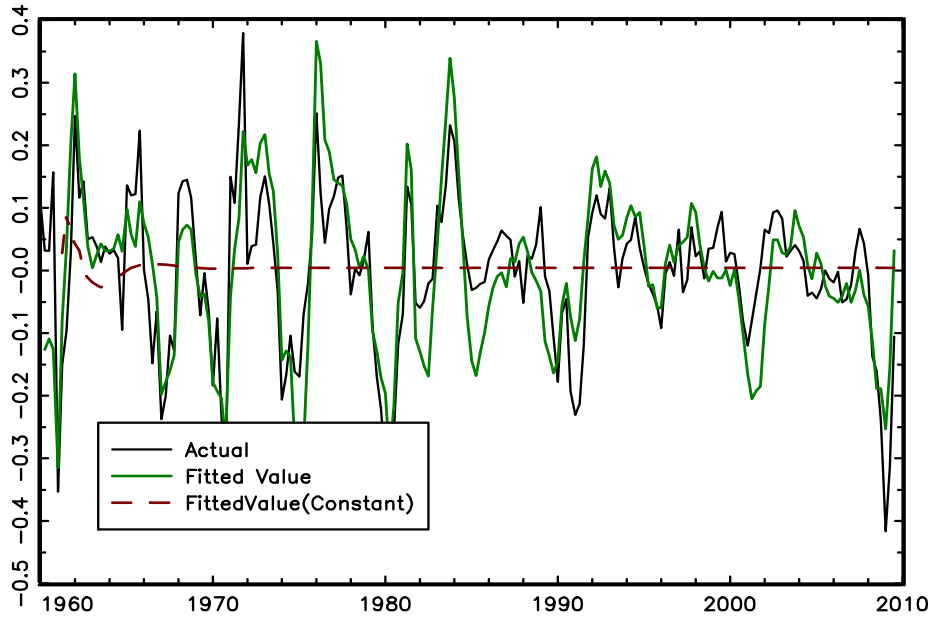
IP: Auto



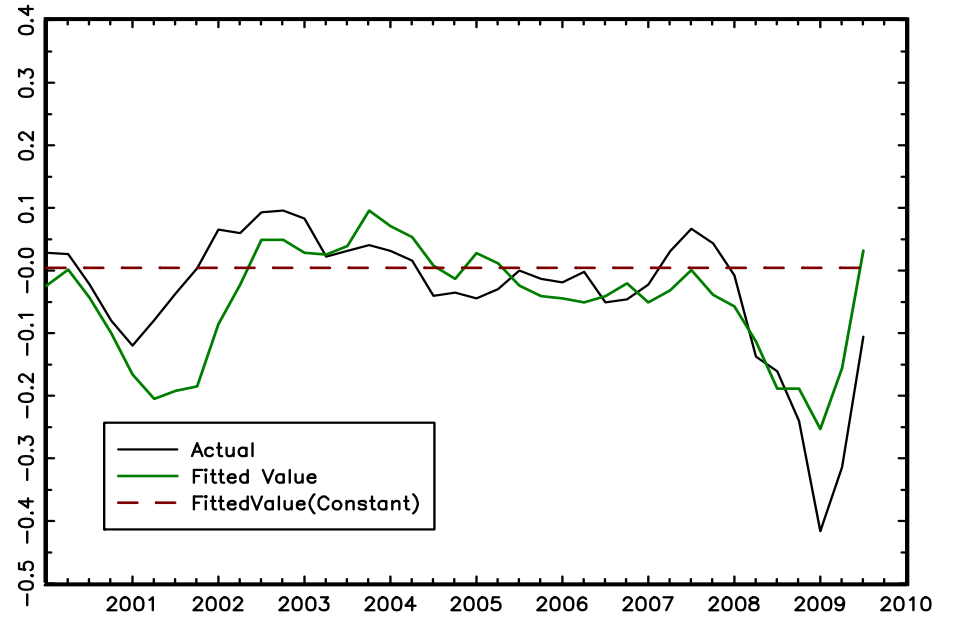
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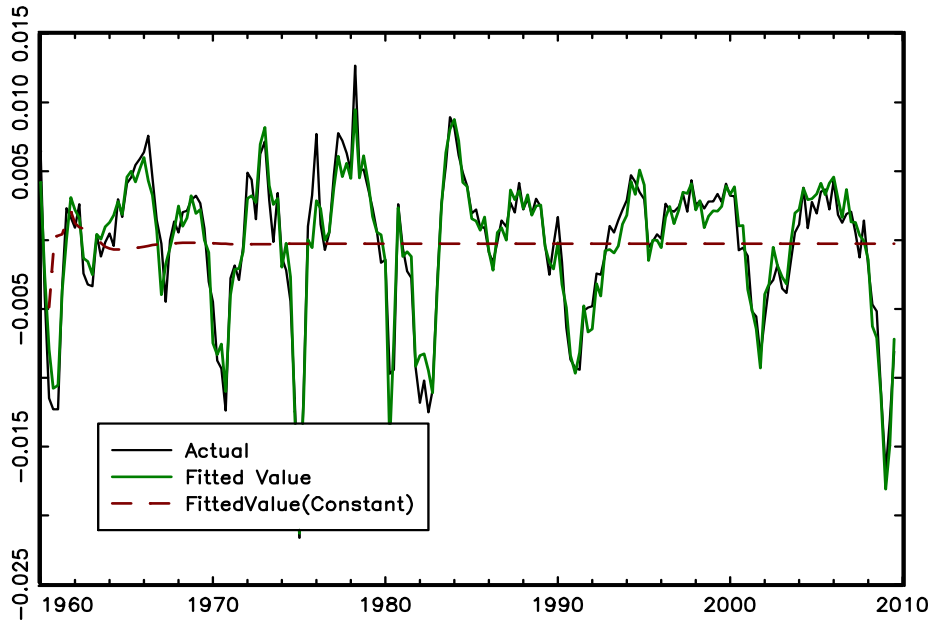
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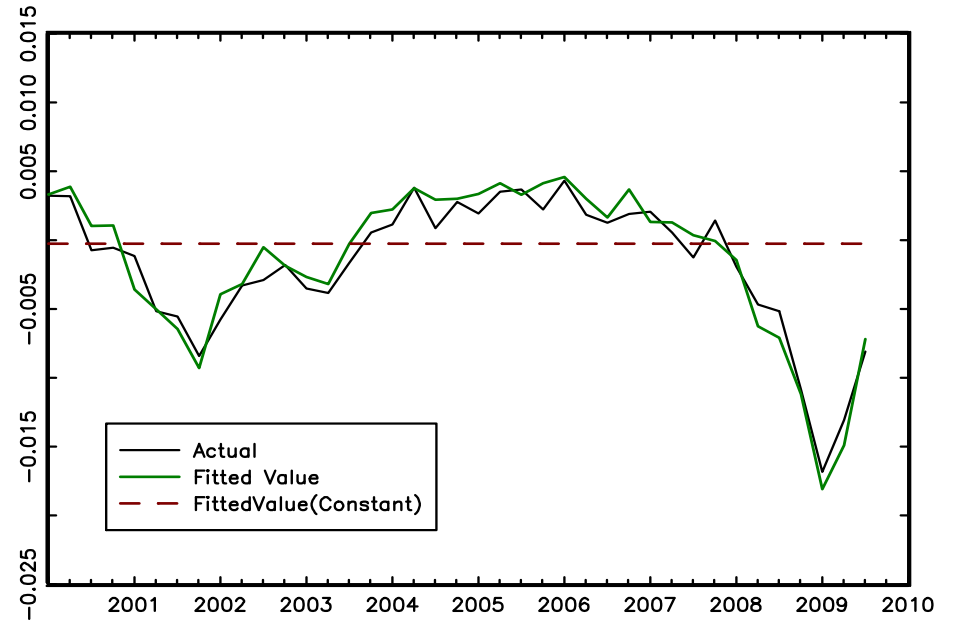
Year-Over-Year



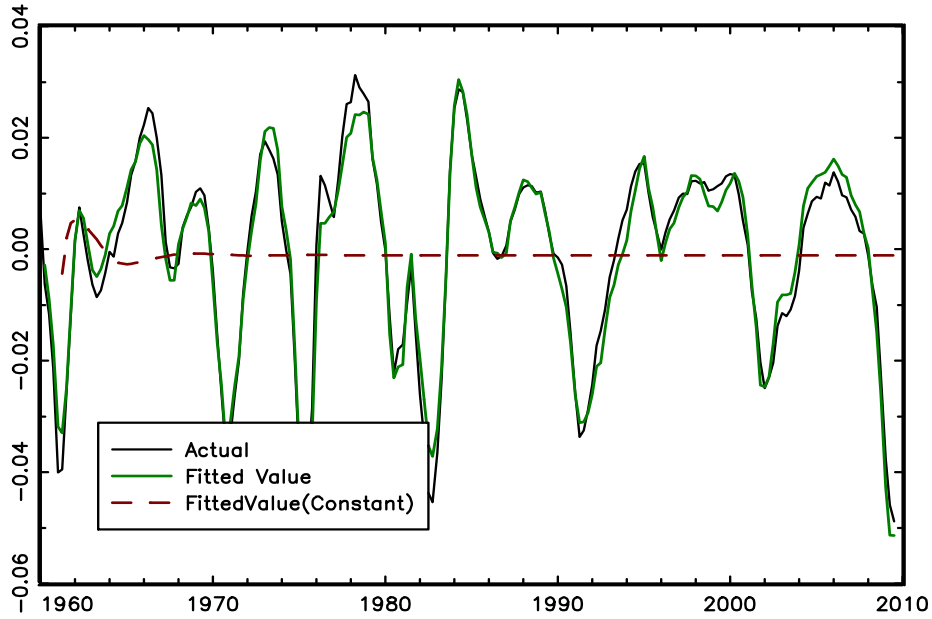
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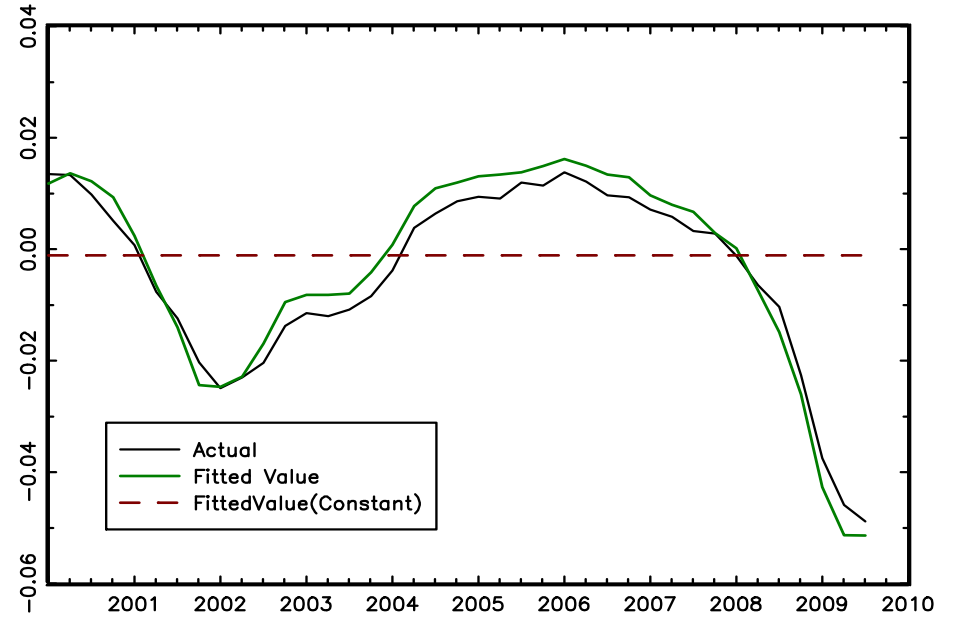
Emp:Nonfarm



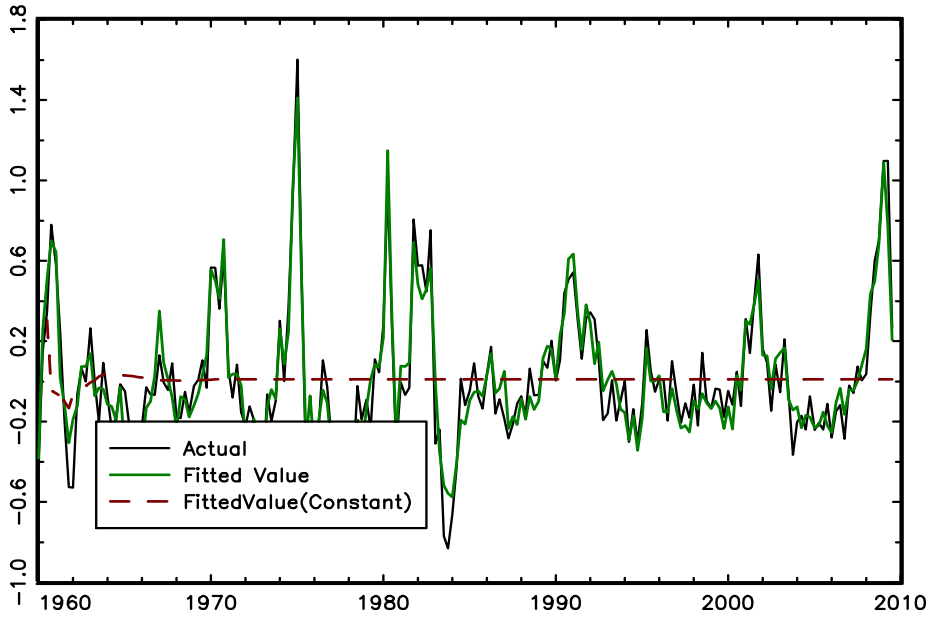
Year-Over-Year



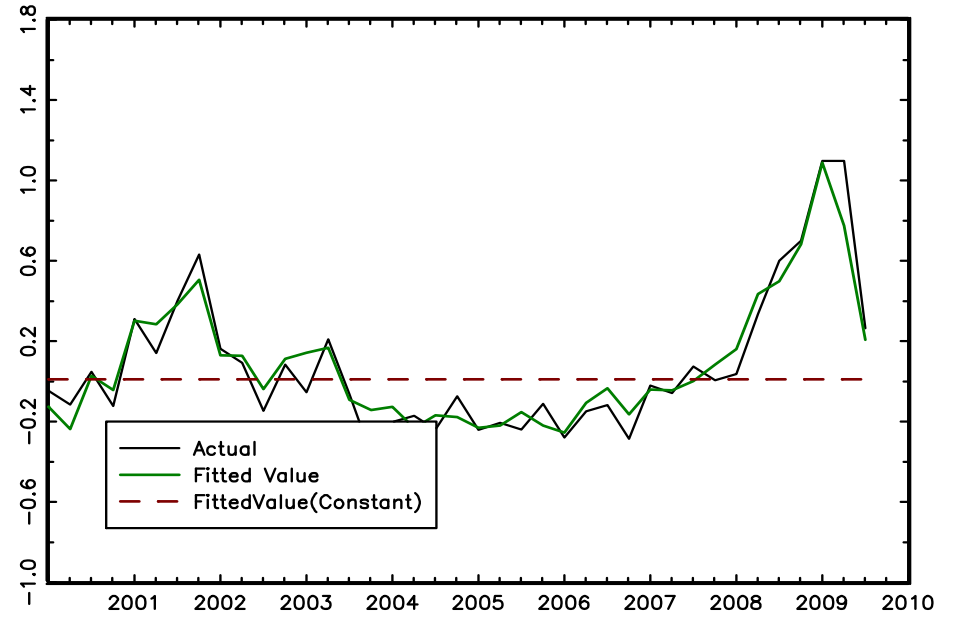
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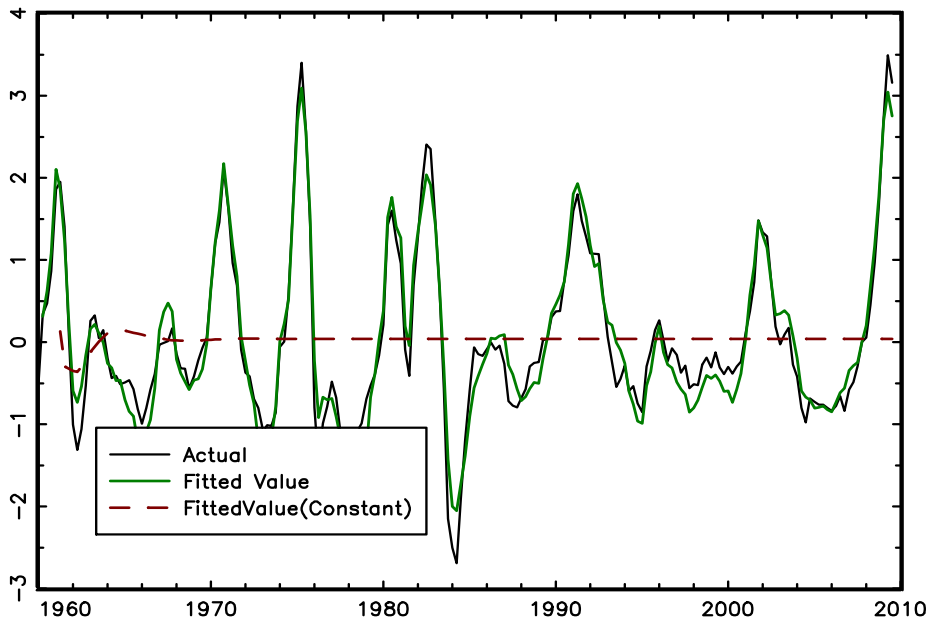
Unemp Rate



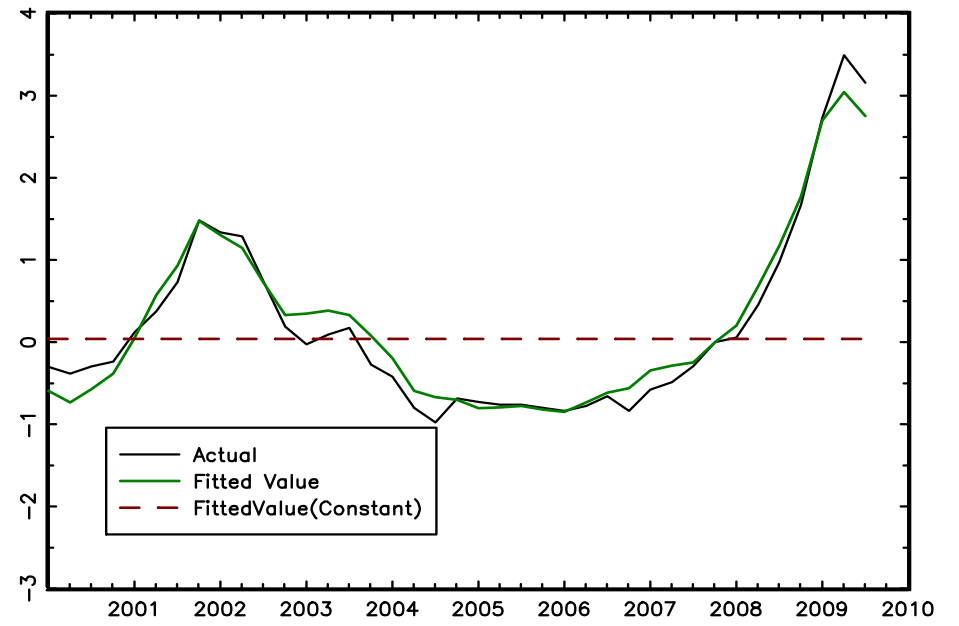
Unemp Rate



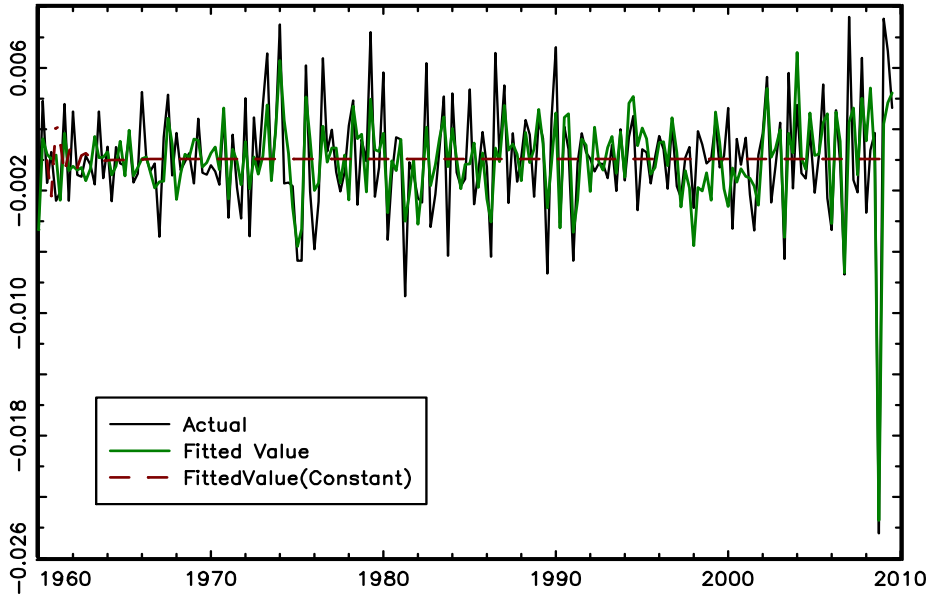
Year-Over-Year



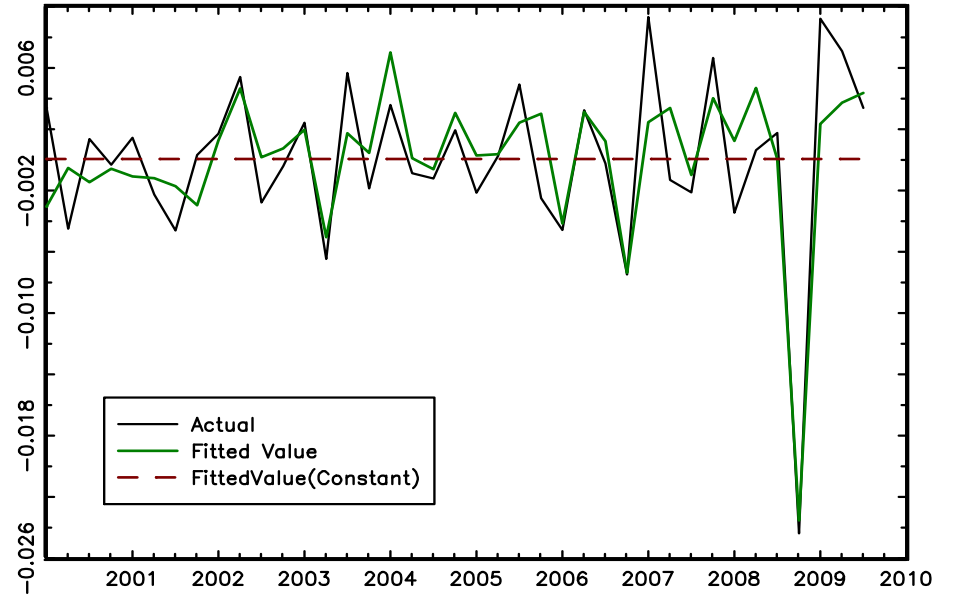
Year-Over-Year



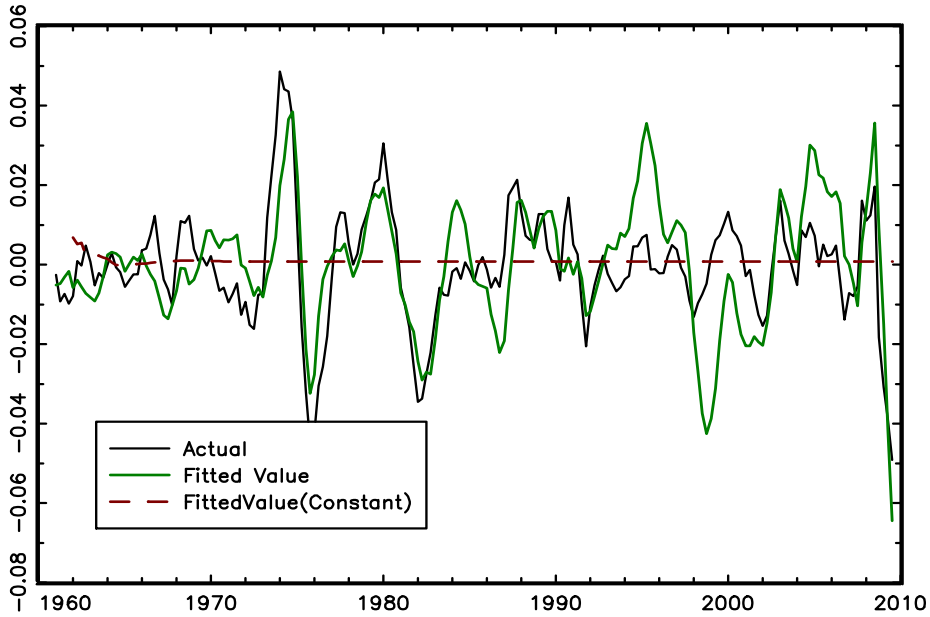
PCED



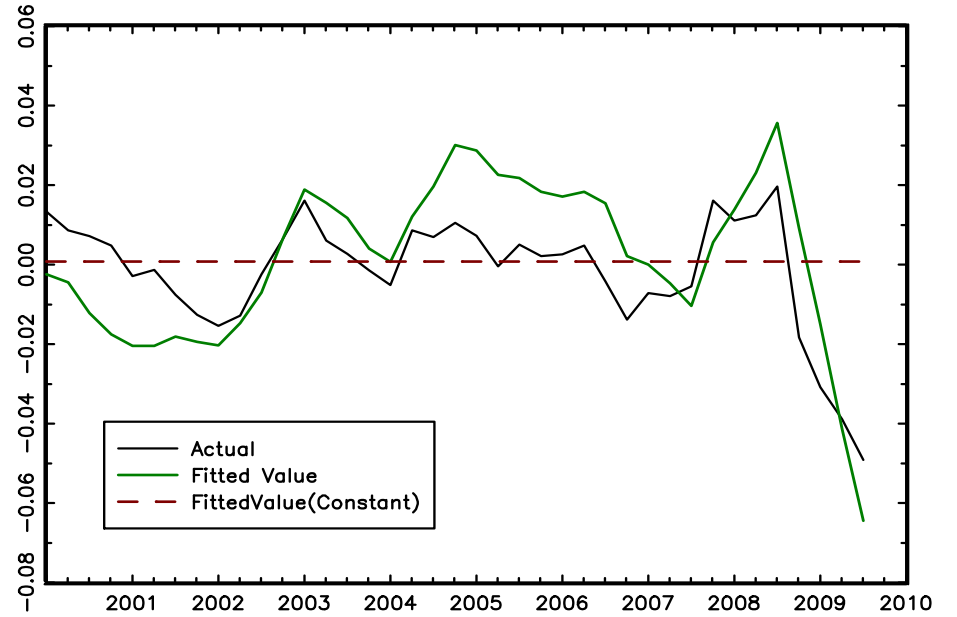
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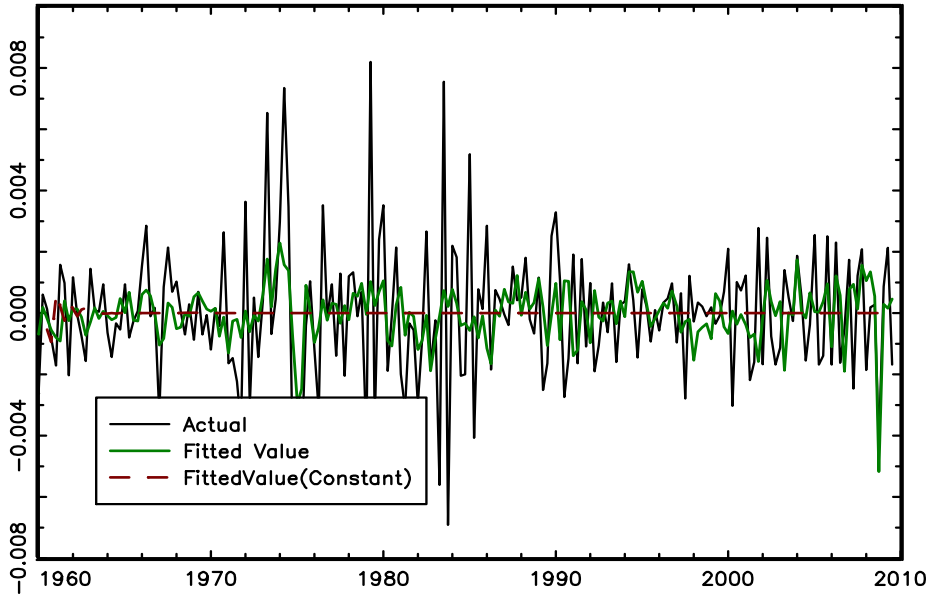
Year-Over-Year



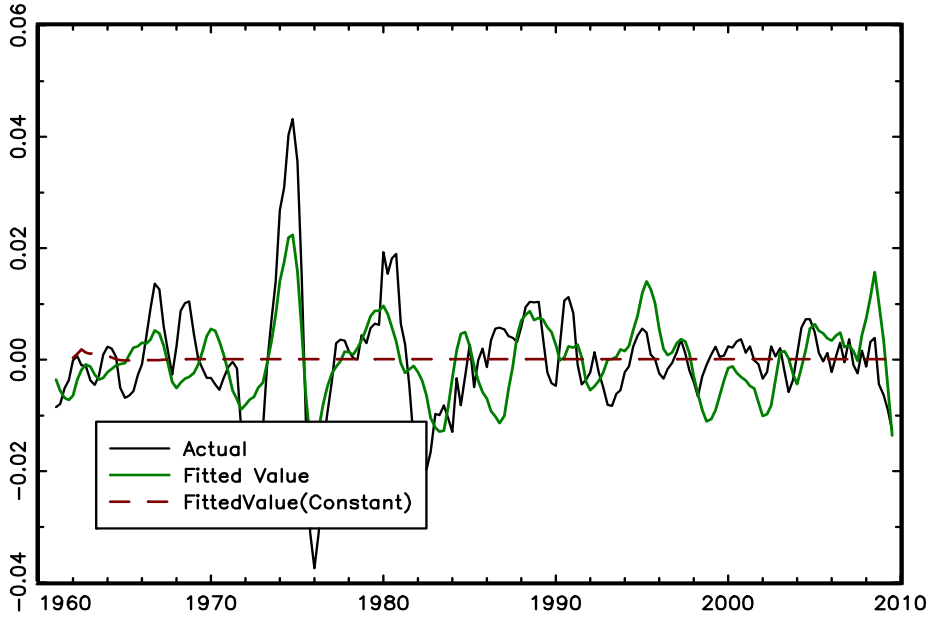
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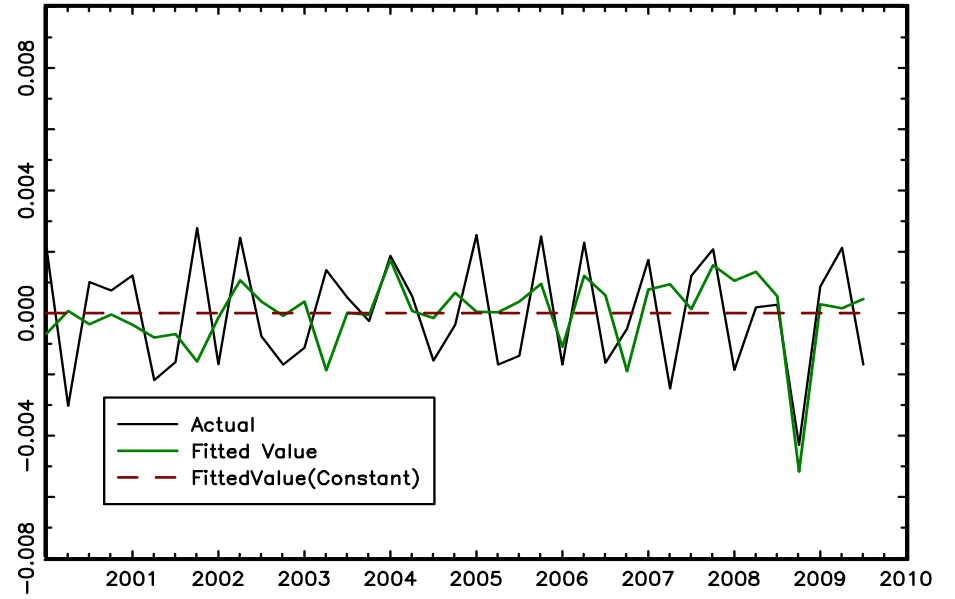
PCED_LFE



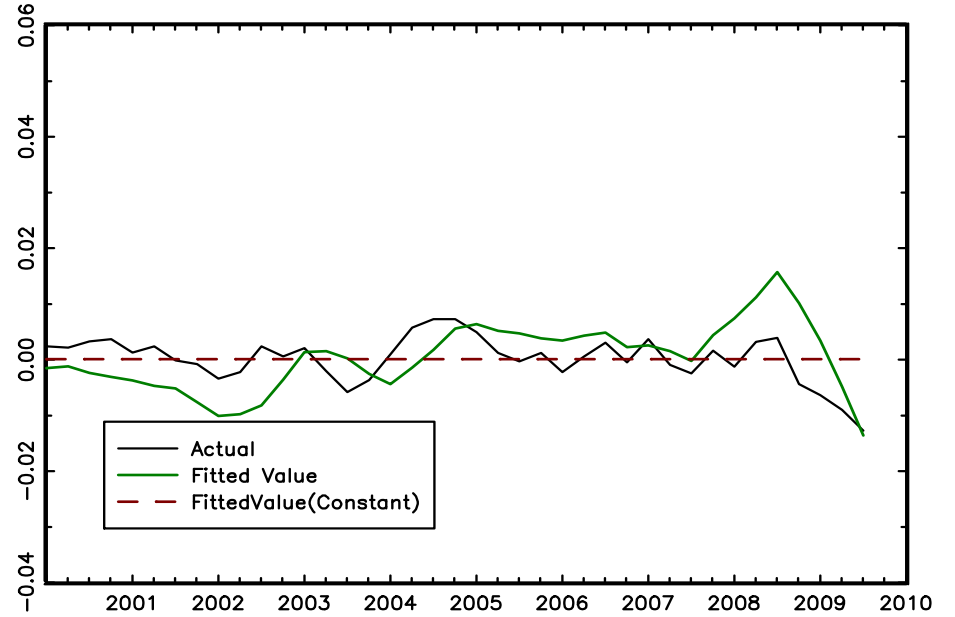
Year-Over-Year



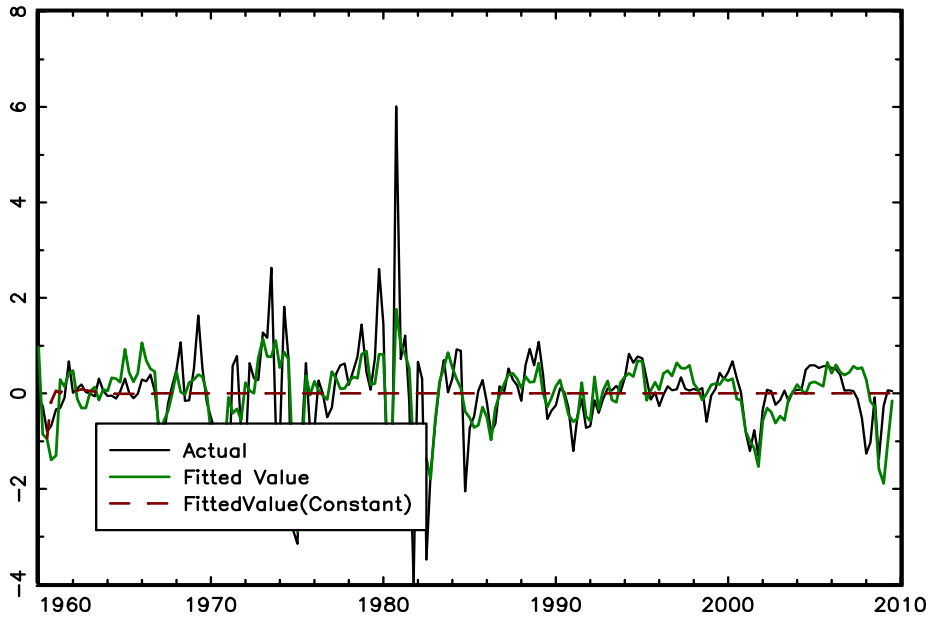
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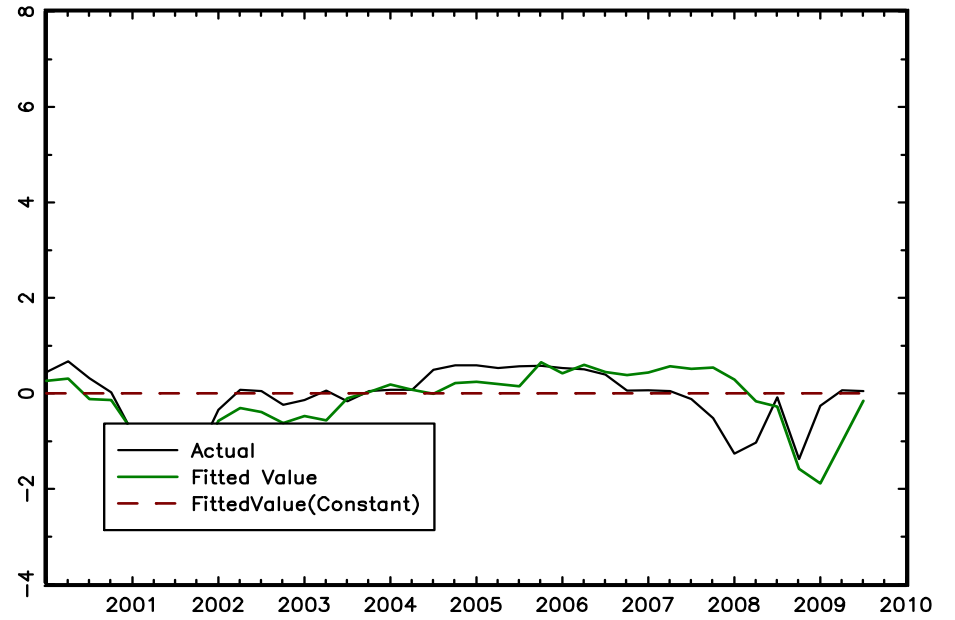
Year-Over-Year



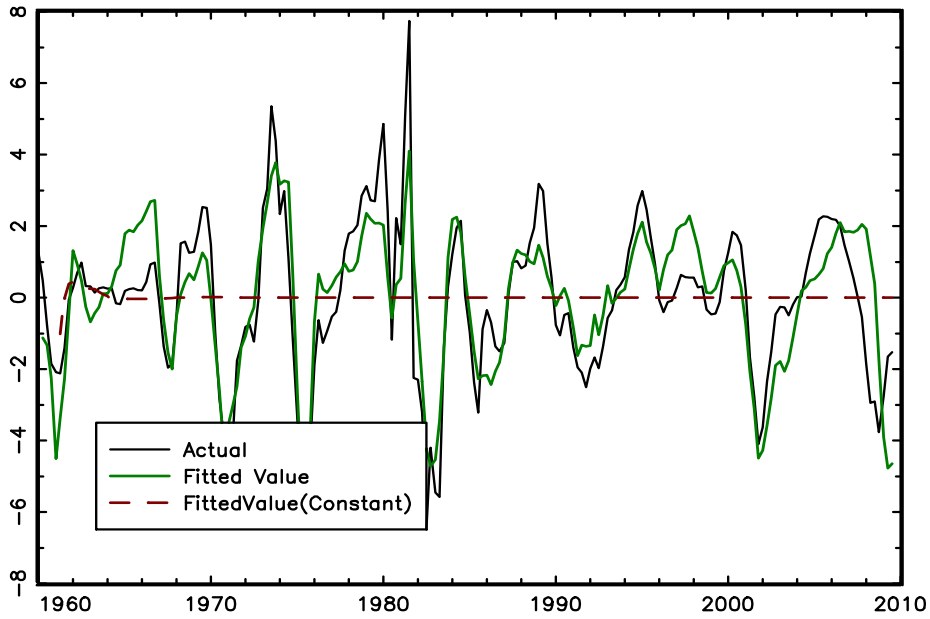
FedFunds



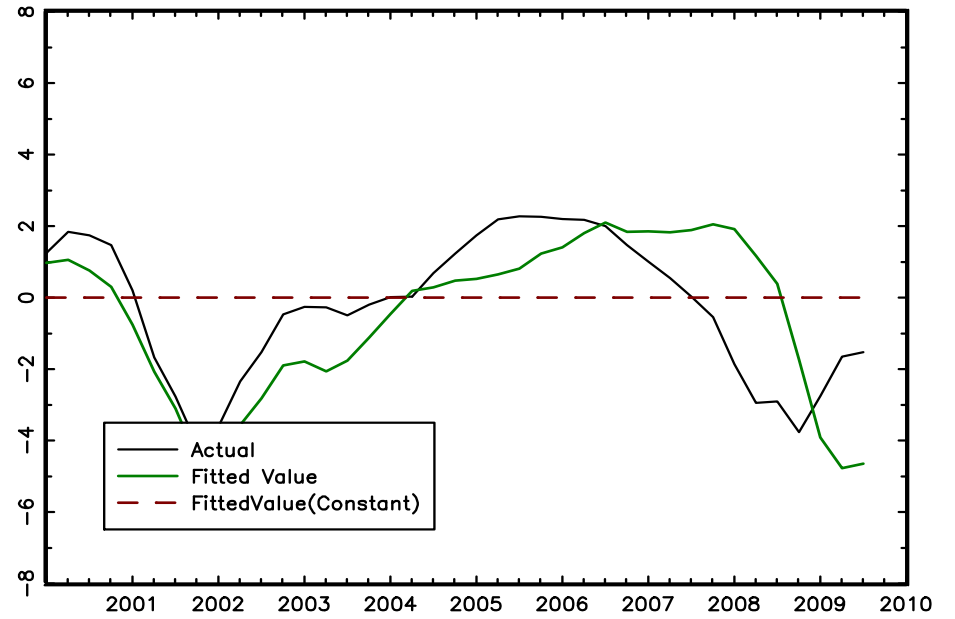
FedFunds



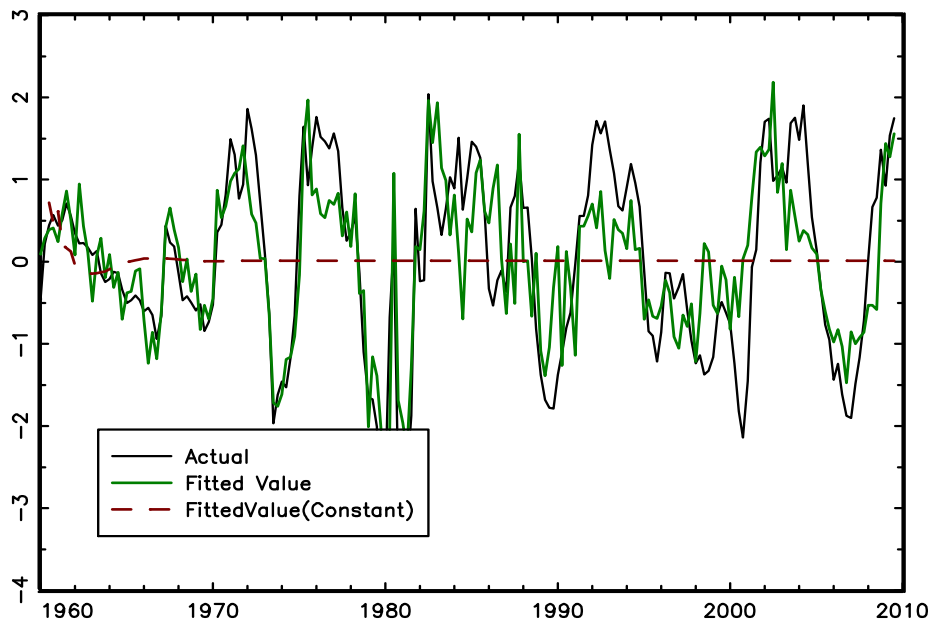
Year-Over-Year



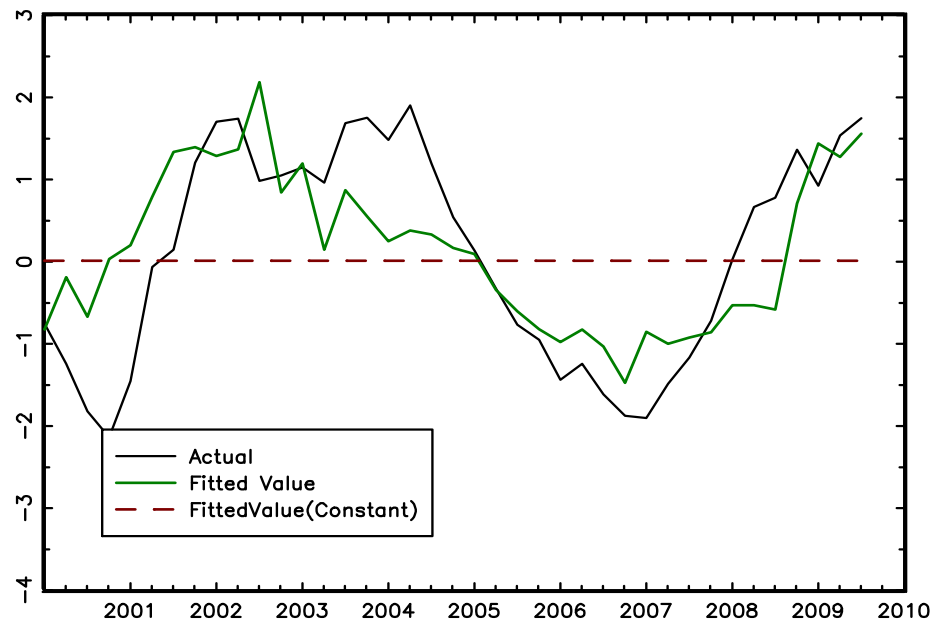
Year-Over-Year



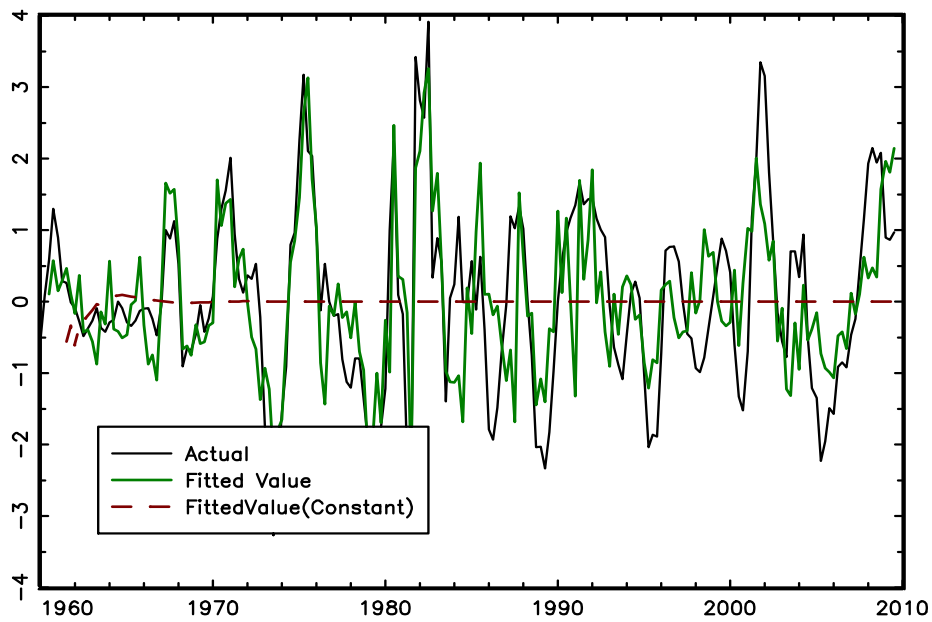
GS10_tb3m



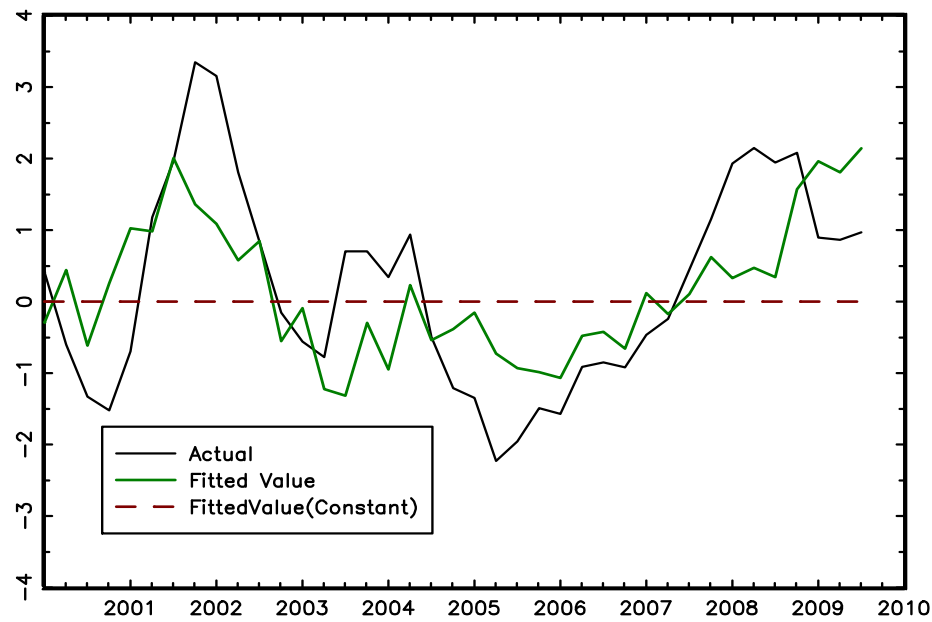
GS10_tb3m



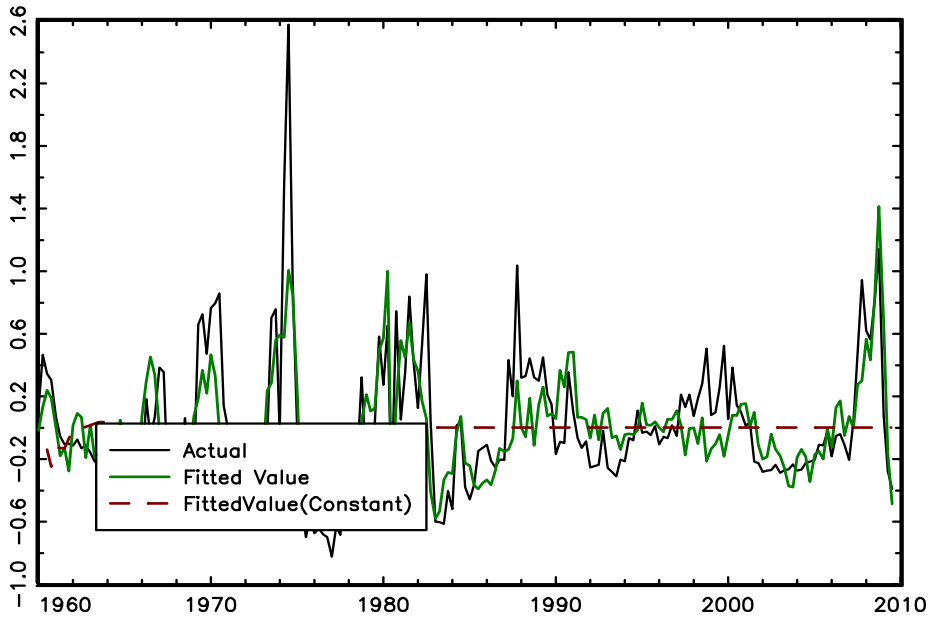
Year-Over-Year



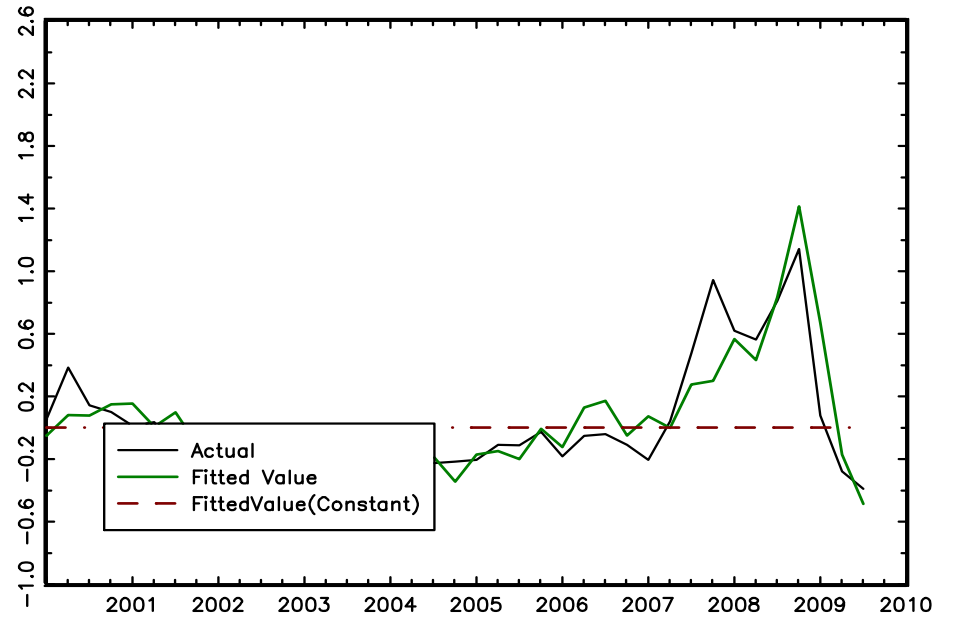
Year-Over-Year



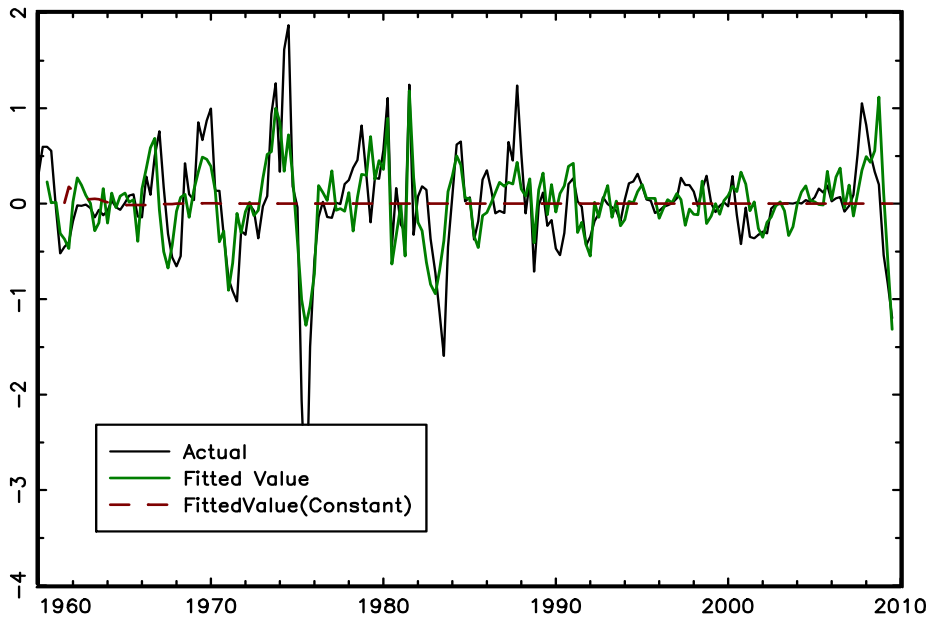
CP_Tbill Spread



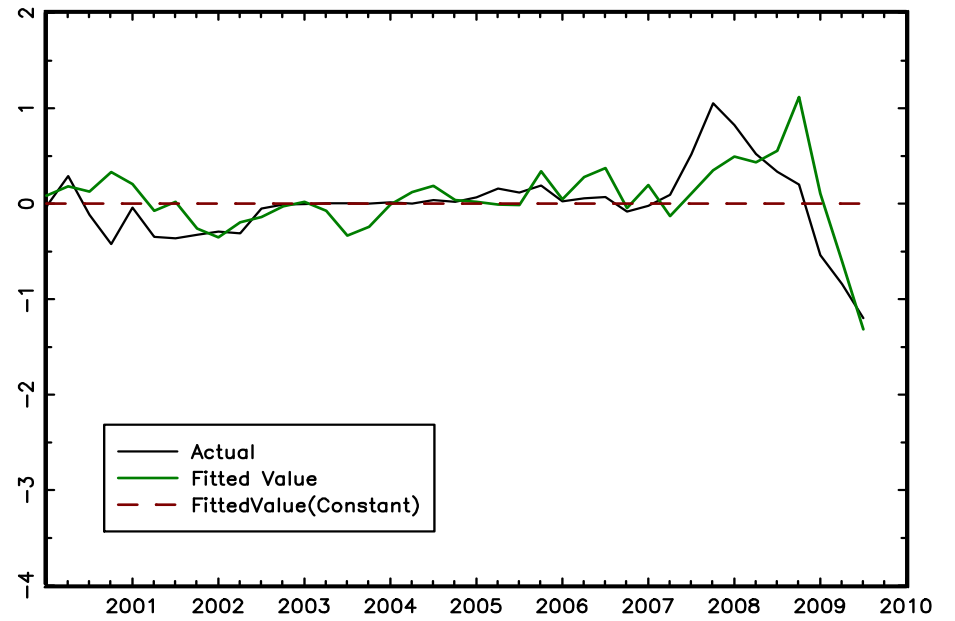
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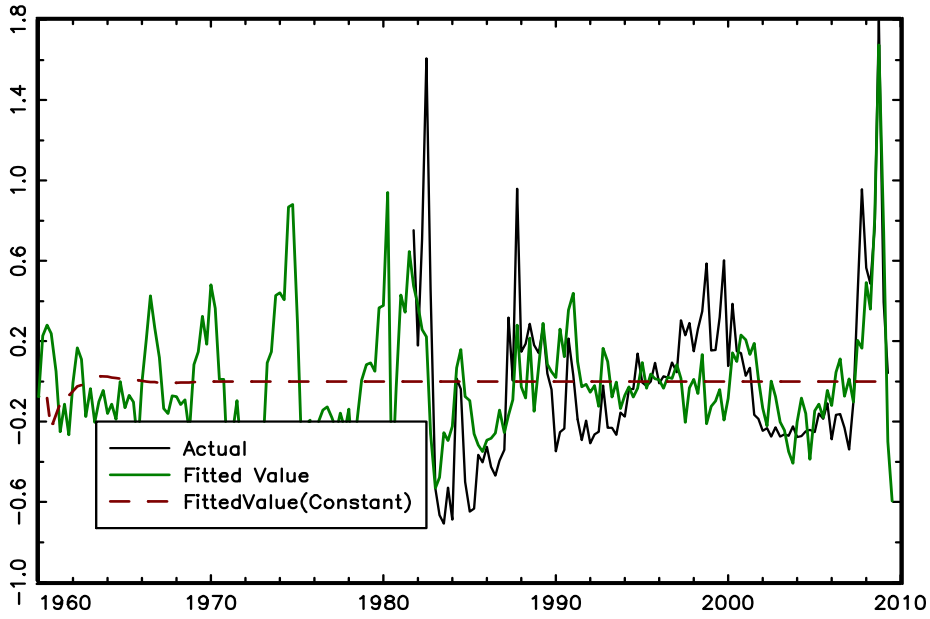
Year-Over-Year



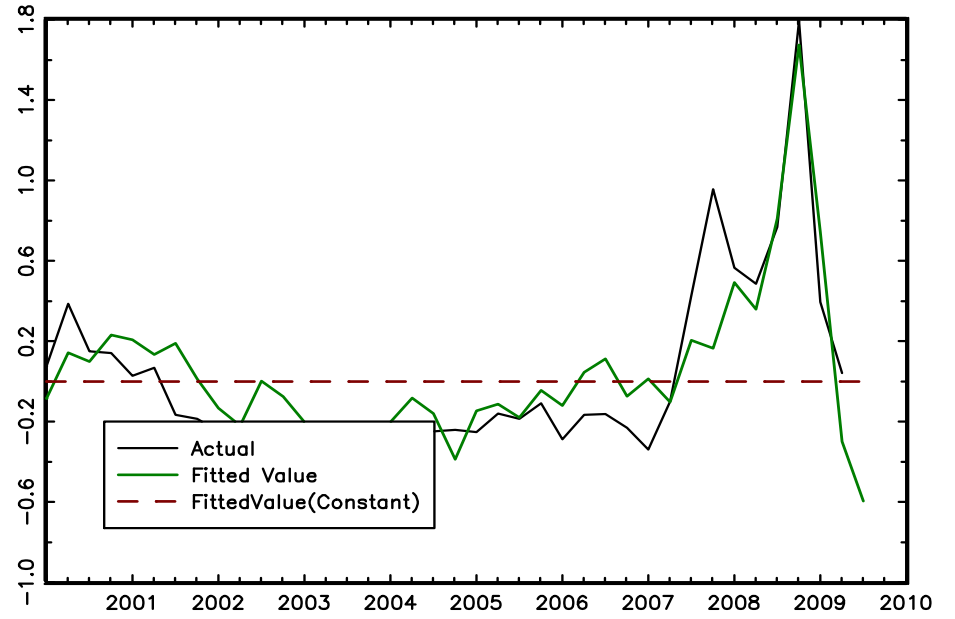
Year-Over-Year



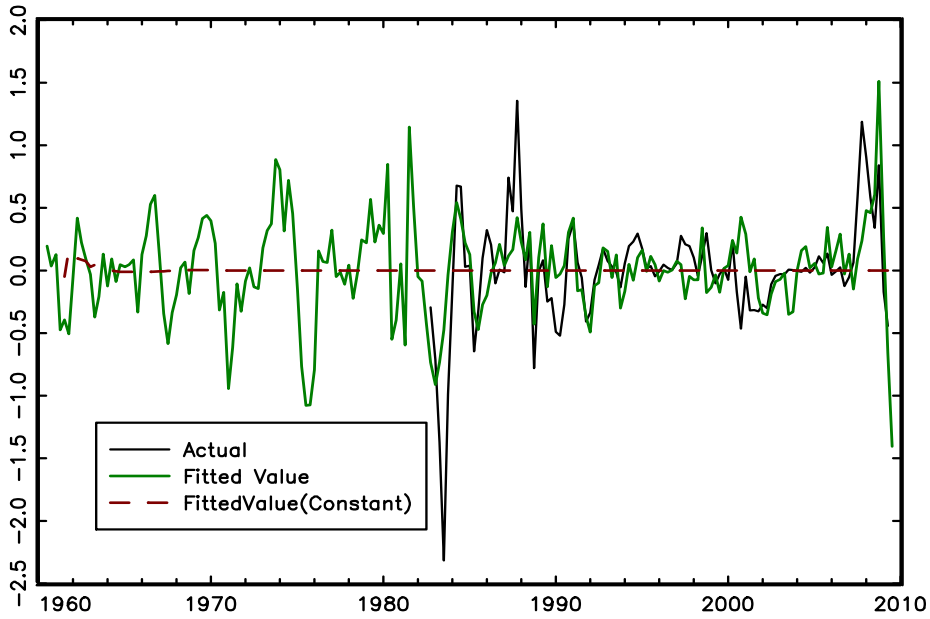
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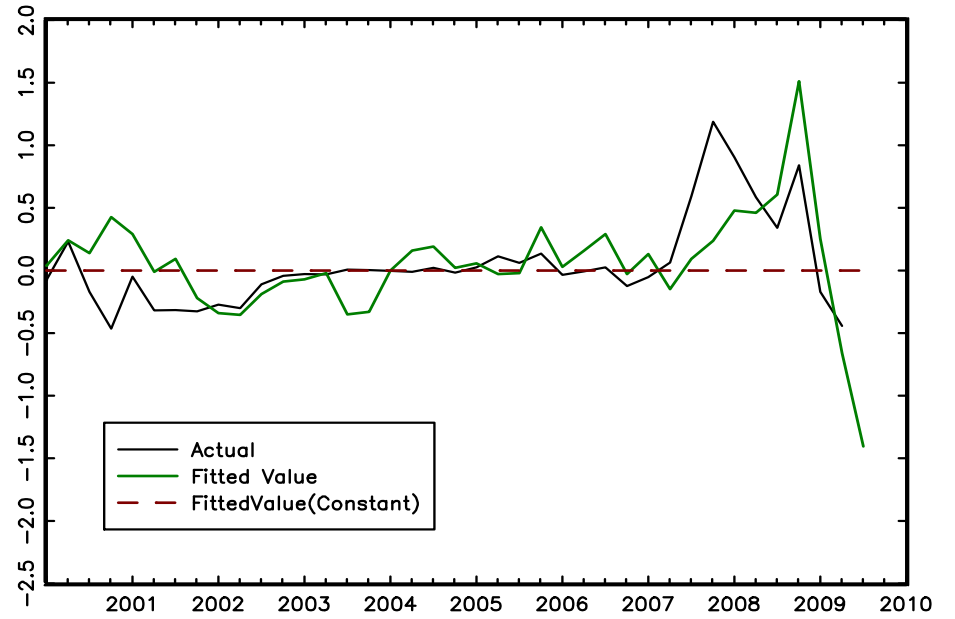
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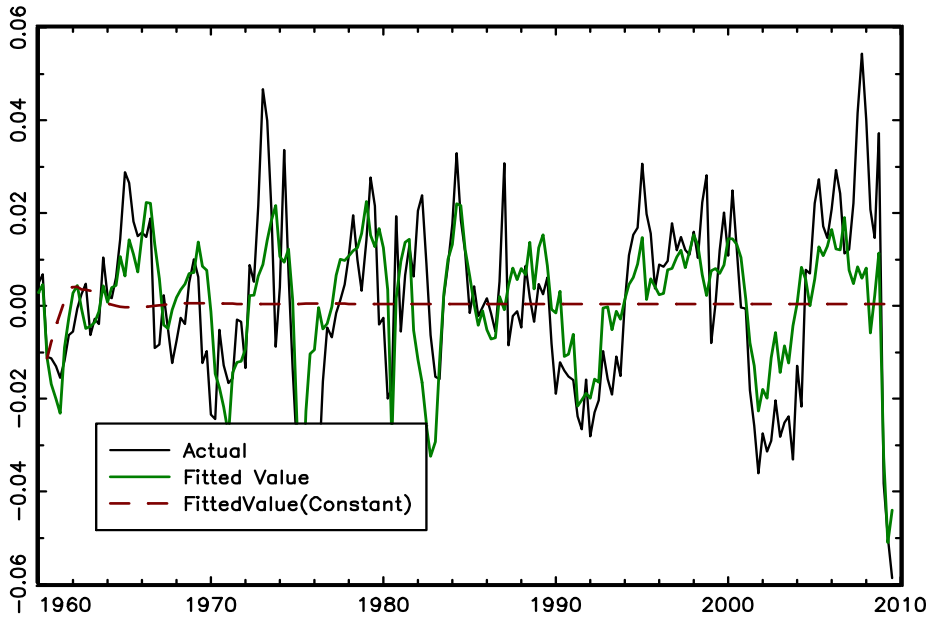
Year-Over-Year



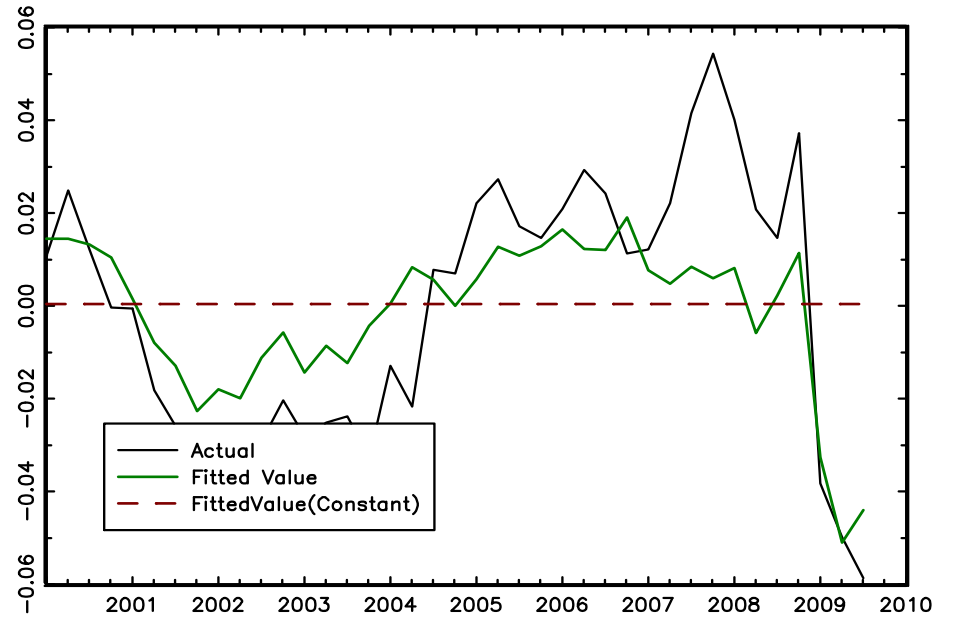
Year-Over-Year



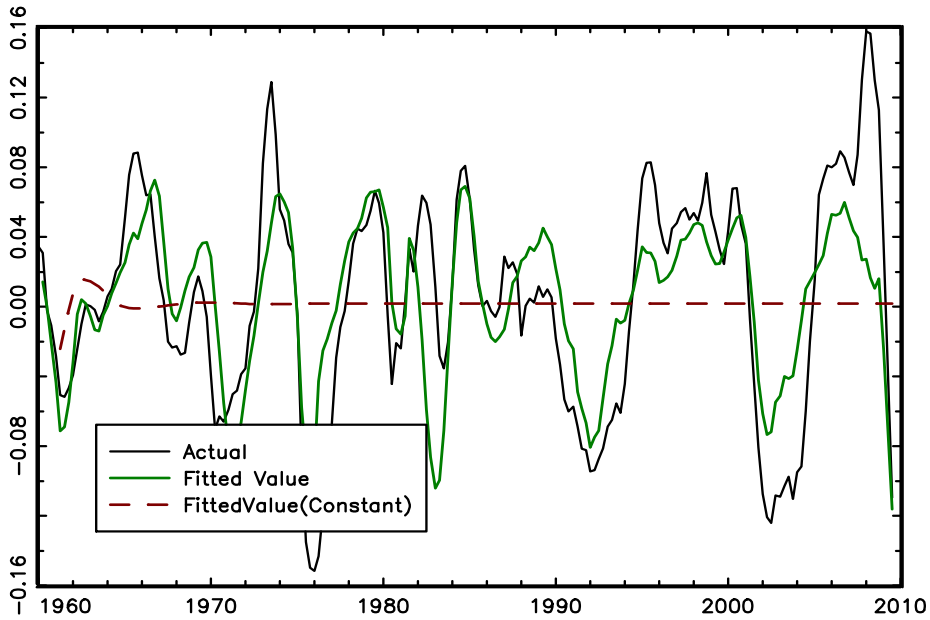
Real C&Lload



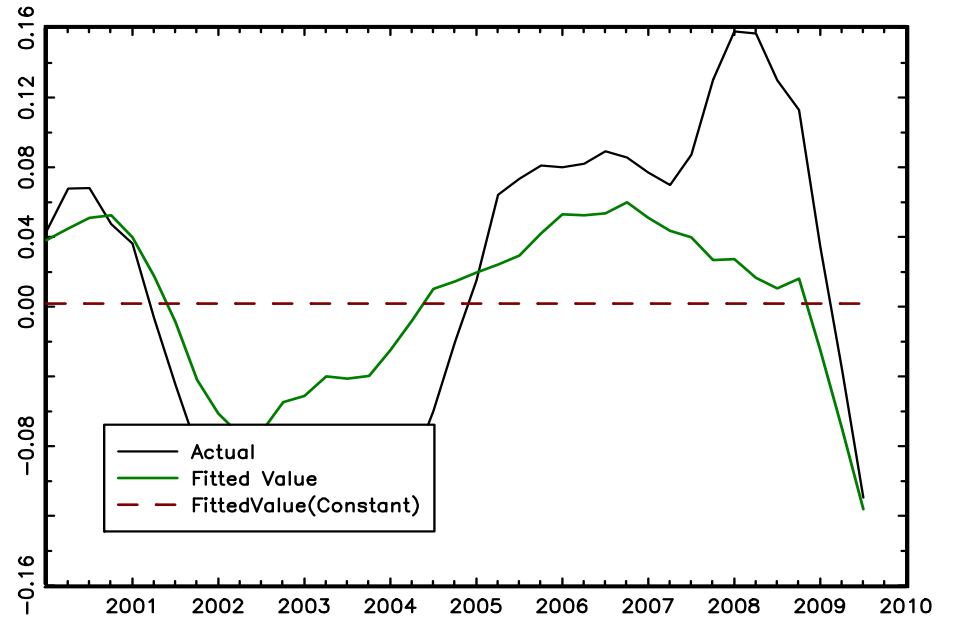
Real C&Lload



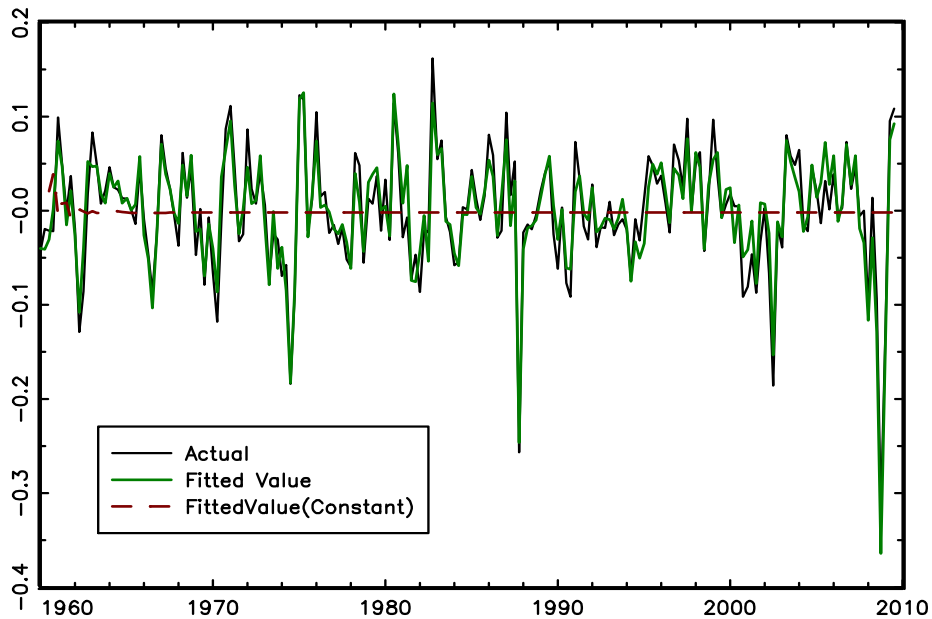
Year-Over-Year



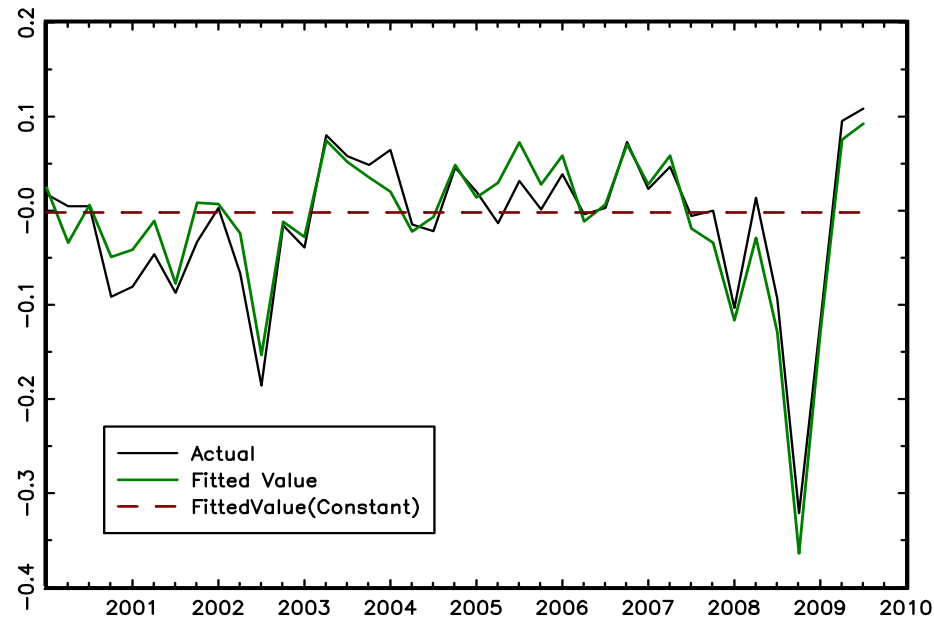
Year-Over-Year



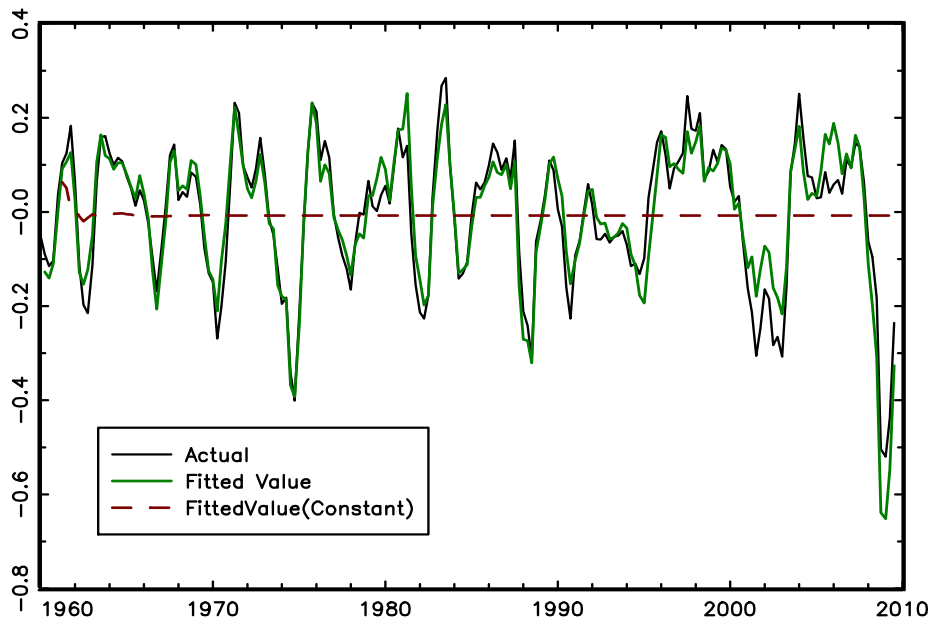
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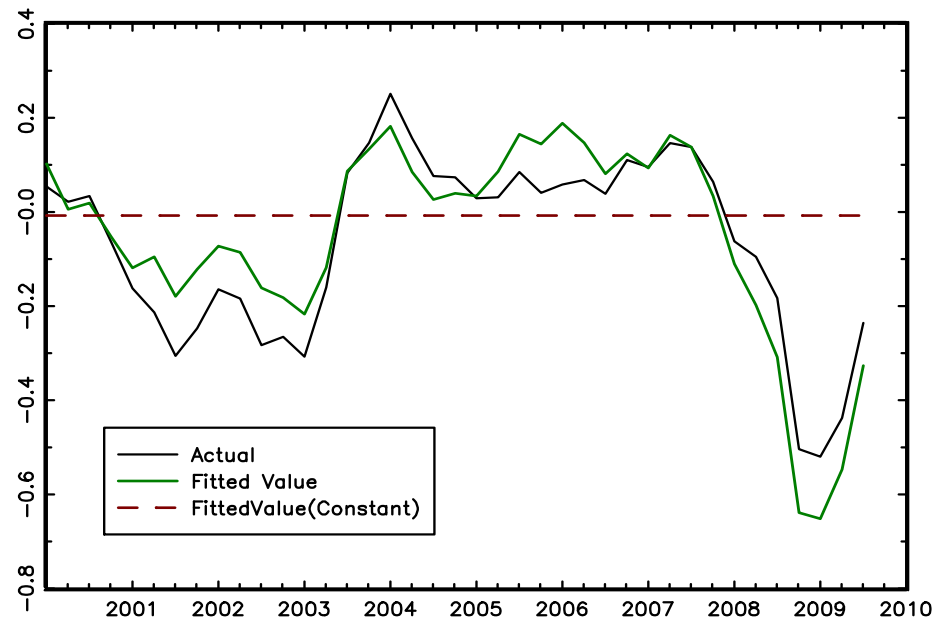
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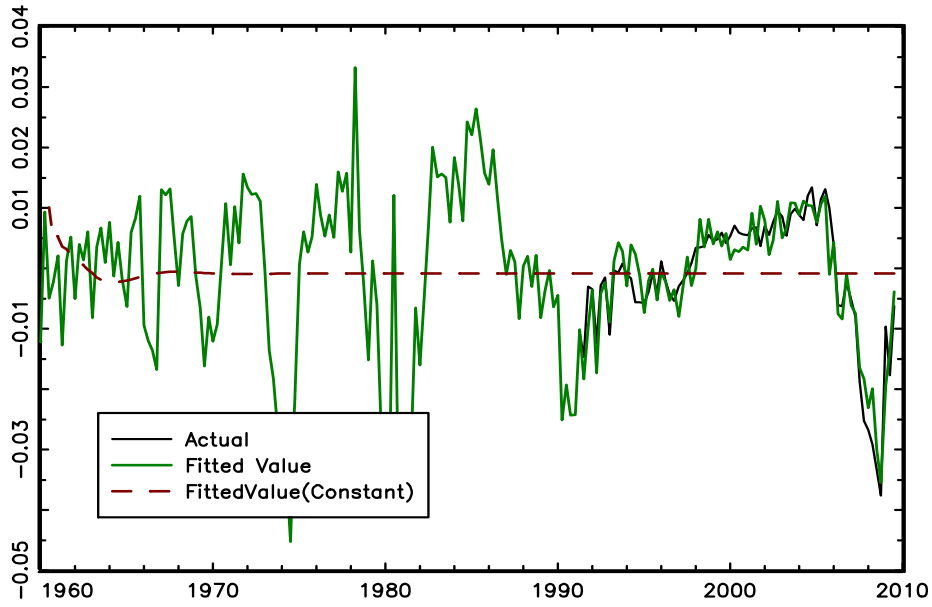
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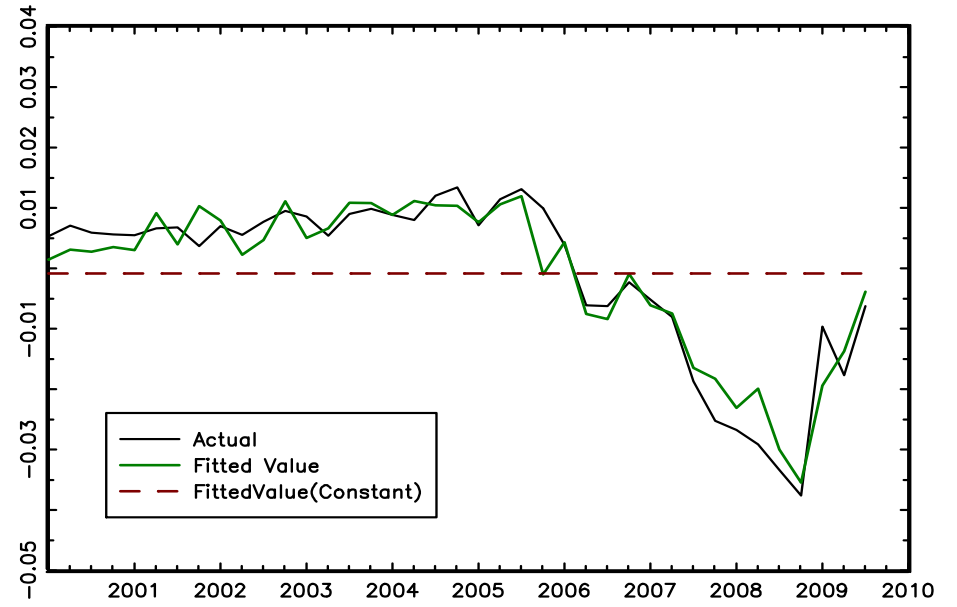
Year-Over-Year



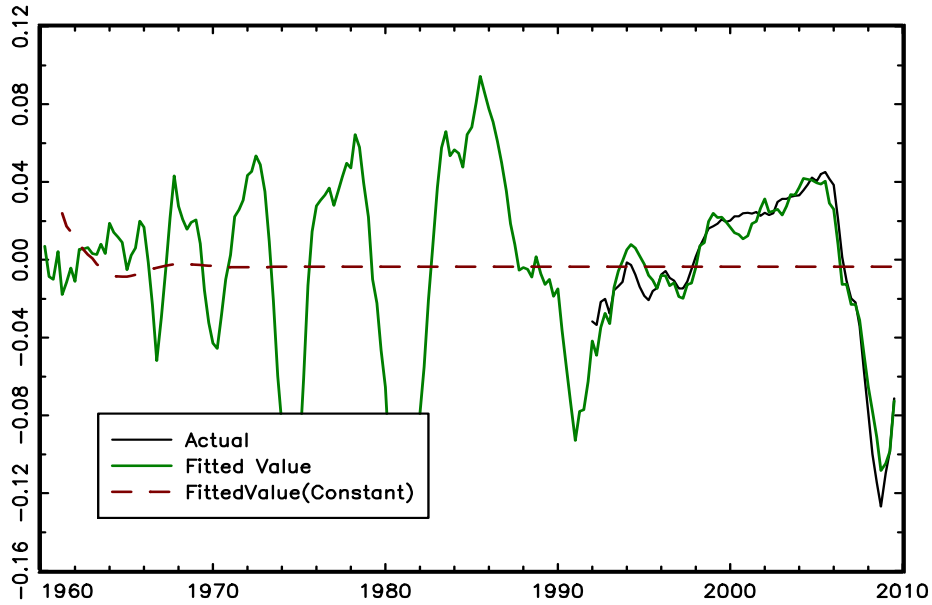
Real Hprice_Purch



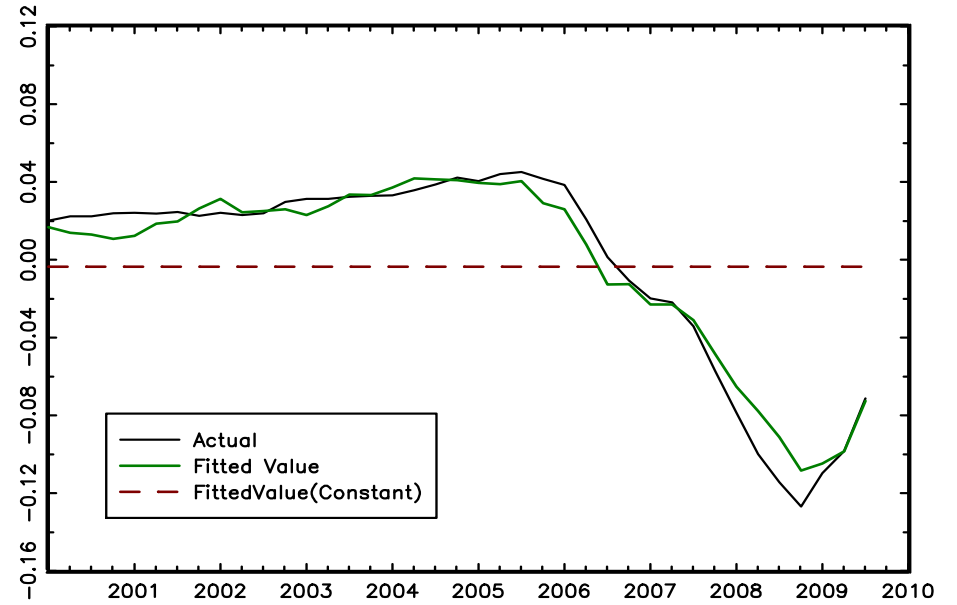
Real Hprice_Purch



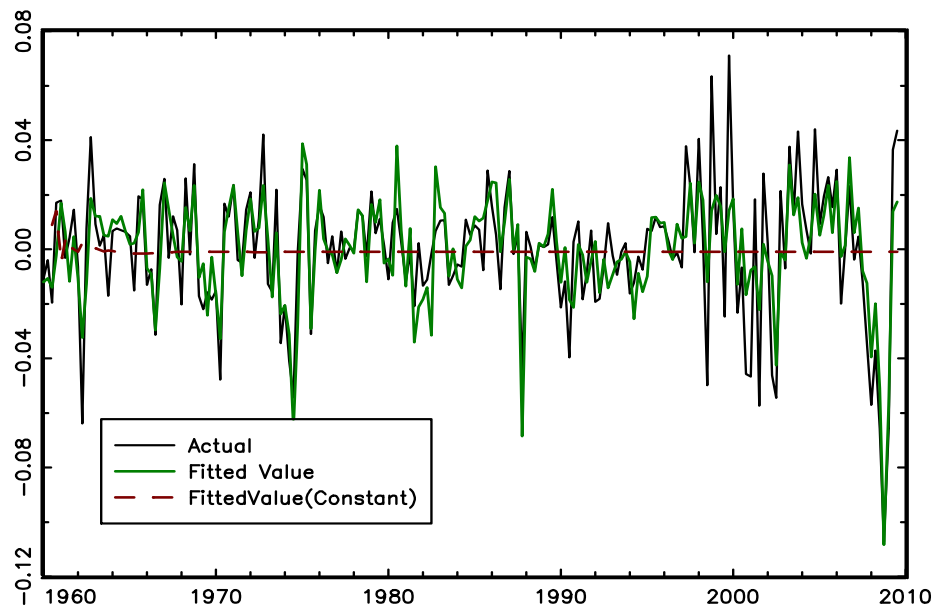
Year-Over-Year



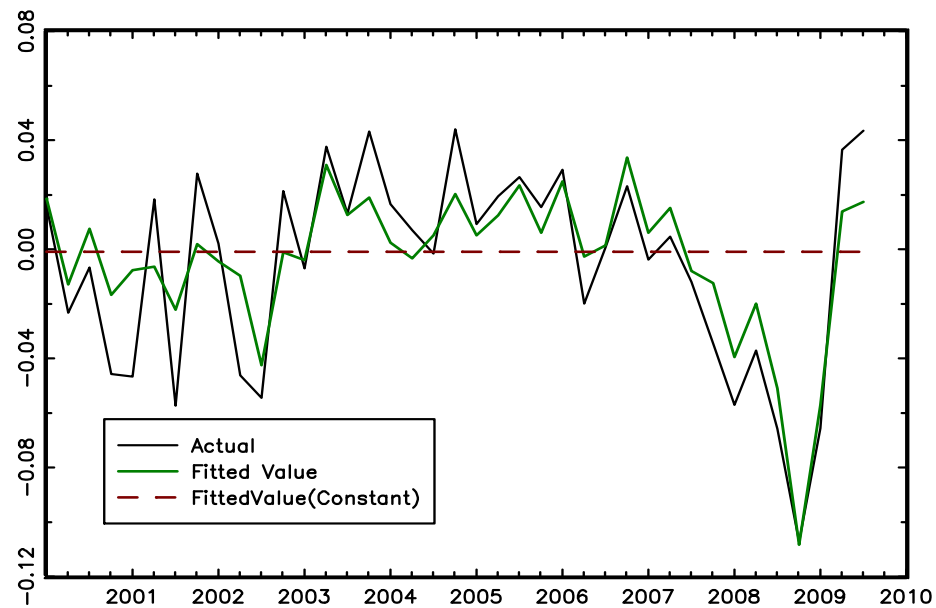
Year-Over-Year



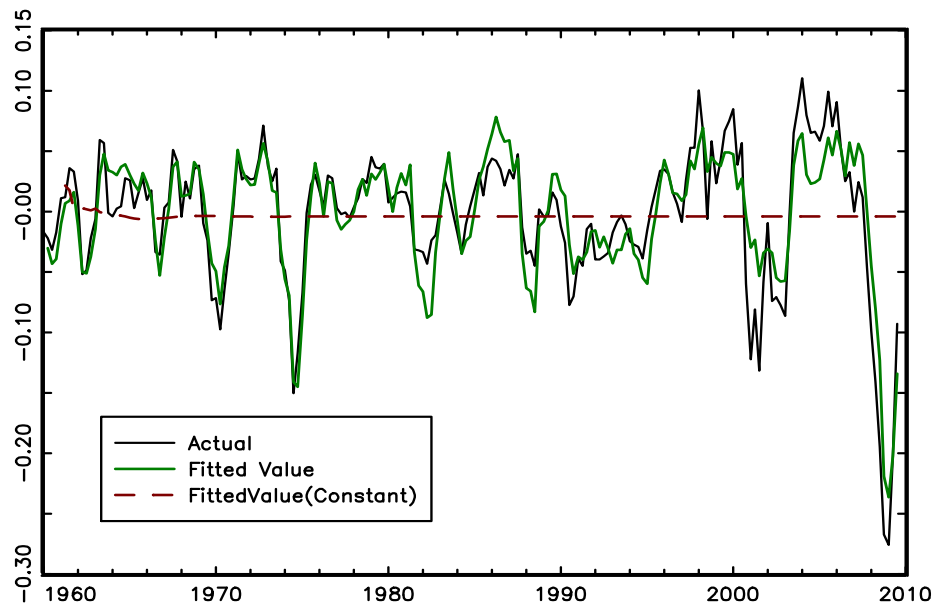
Real HHW:W



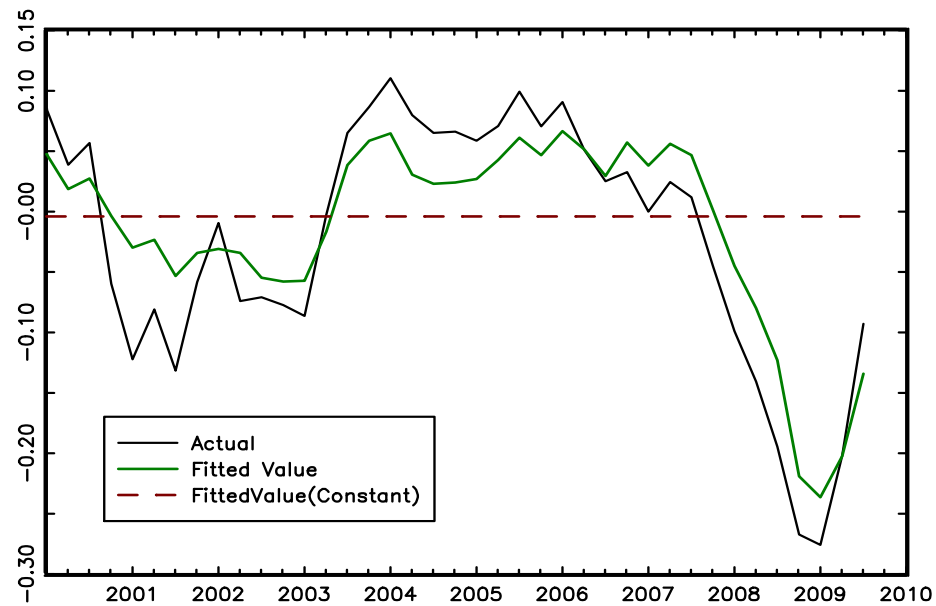
Real HHW:W



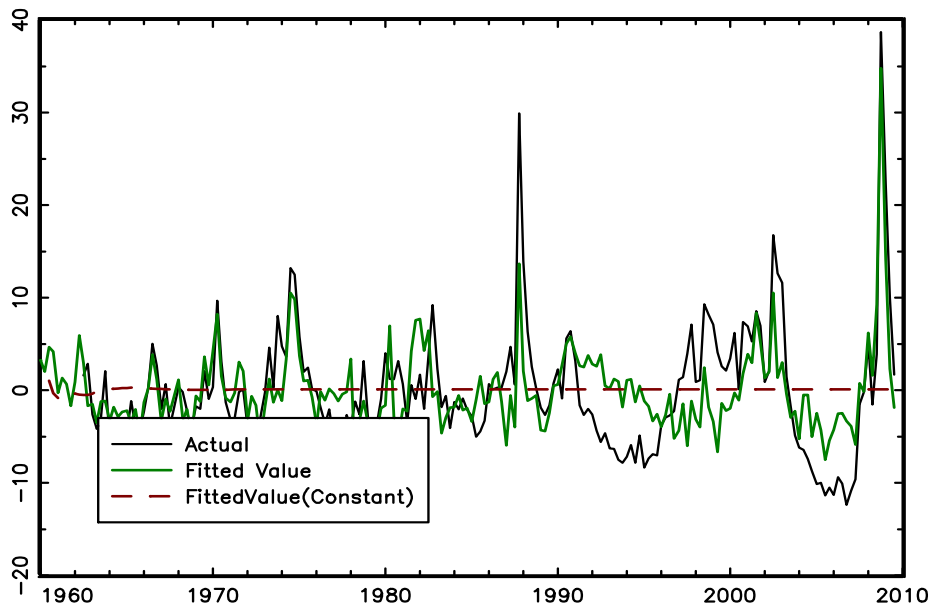
Year-Over-Year



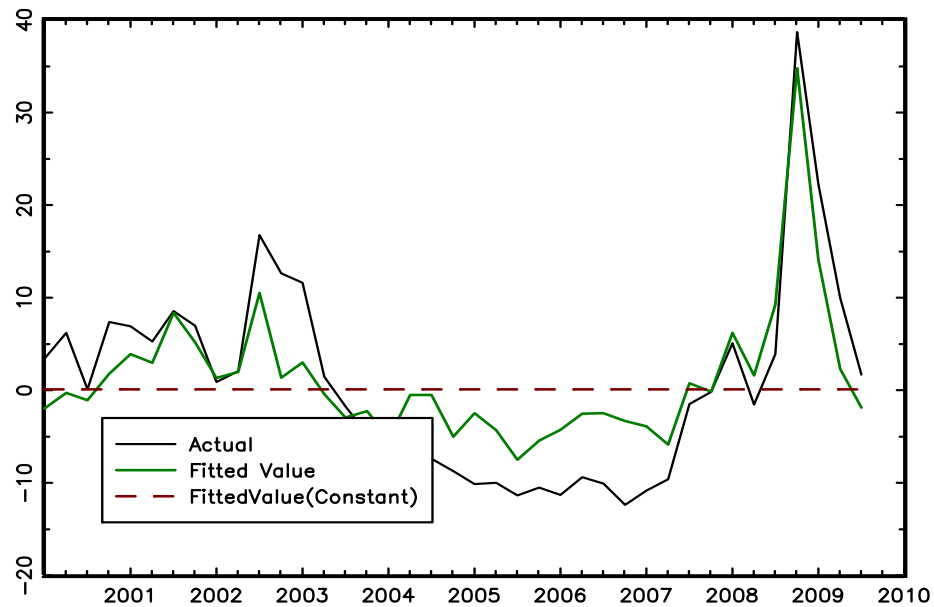
Year-Over-Year



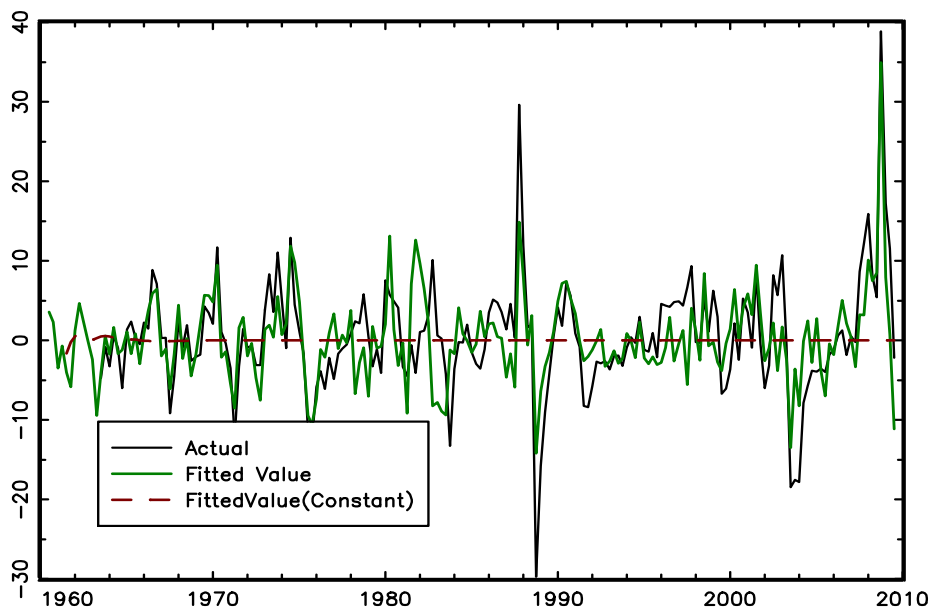
VXO



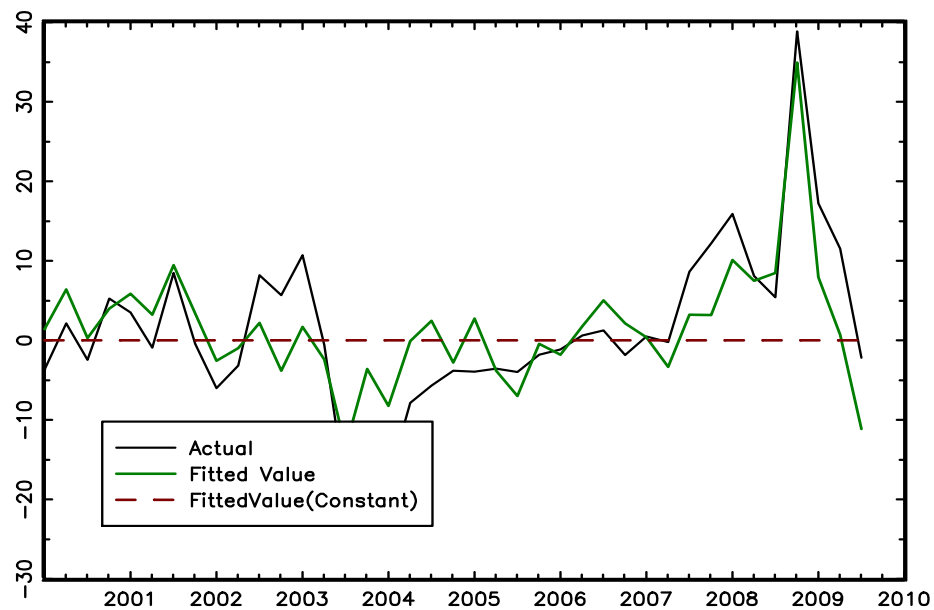
VXO



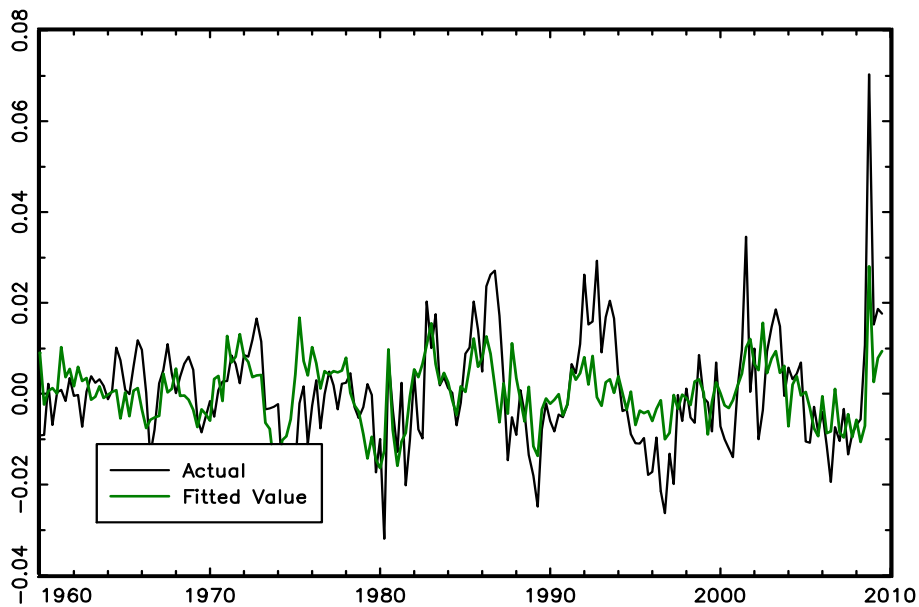
Year-Over-Year



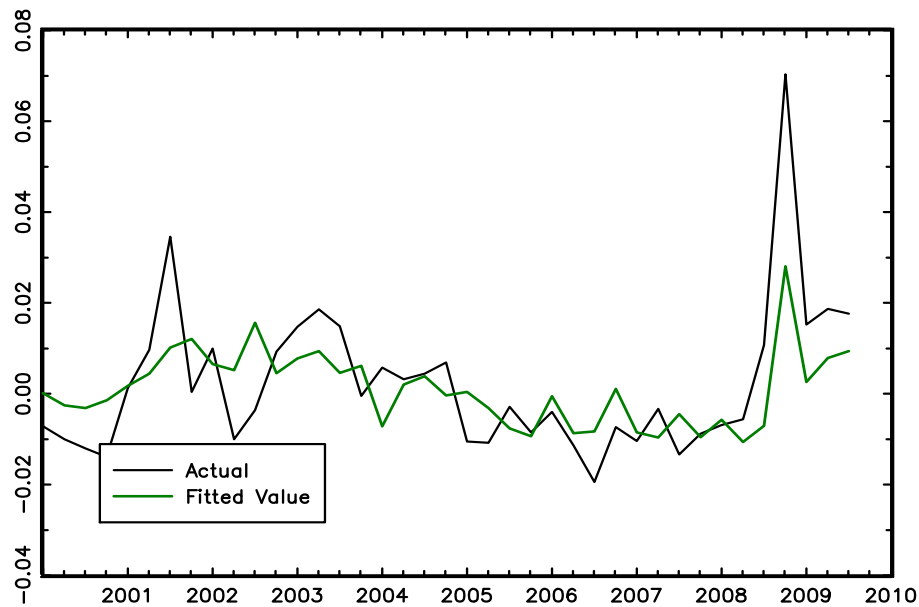
Year-Over-Year



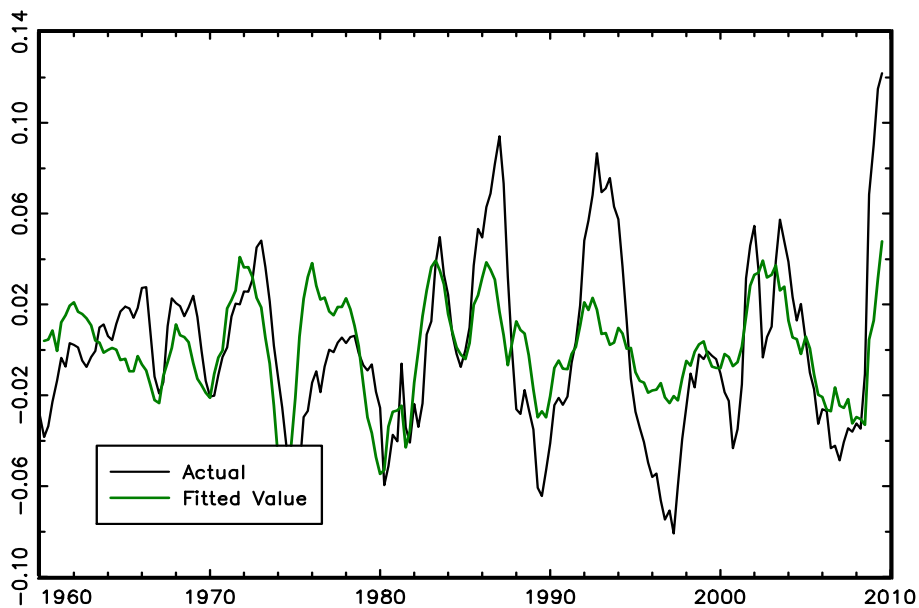
Real m1



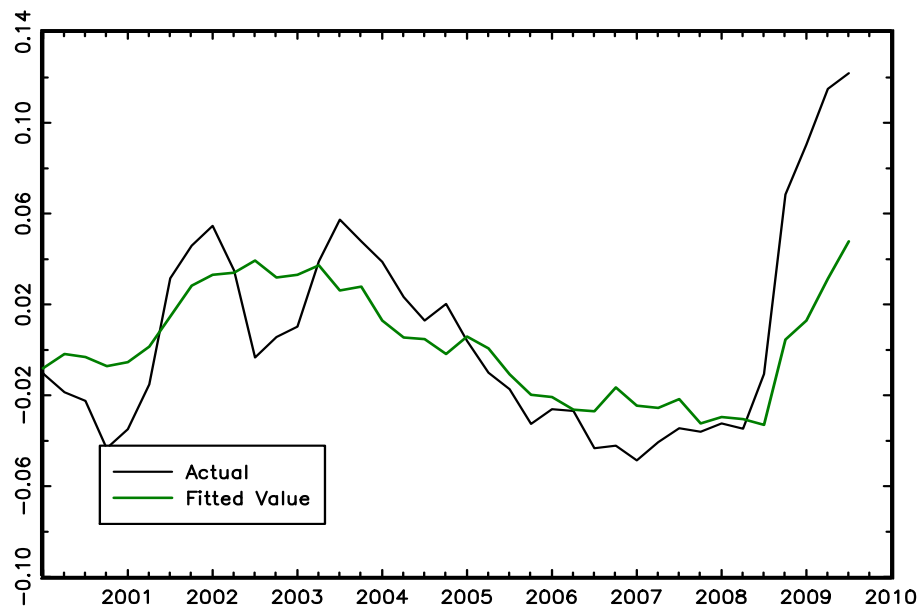
Real m1



Year-Over-Year



Year-Over-Year



Relative Root Mean Squared Error:

$$RRMSE_{i,p} = \frac{\sqrt{\frac{1}{8} \sum_{t=2007:4}^{2009:3} \hat{u}_{it}^2}}{\sqrt{\frac{1}{T_p} \sum_{t \in p} \hat{u}_{it}^2}}$$

Periods: 1959:III – 2007:III

1984:I – 2007:III

Peak to (Peak+7 Quarters) for other recessions

$$\text{Relative RMSE} = (\text{RMSE}_{\text{ThisRecession}}) / (\text{RMSE}_{\text{OtherPeriods}})$$

Real GDP

1959-2007	1984-2007	Recession Beginning in						
		1960:2	1969:4	1973:4	1980:1	1981:3	1990:3	2001:1
0.80	1.16	0.84	0.62	0.56	0.46	0.60	1.41	1.52

Other Series

Series	1959-2007	1984-2007	Recession Beginning in						
			1960:2	1969:4	1973:4	1980:1	1981:3	1990:3	2001:1
GDP	0.80	1.16	0.84	0.62	0.56	0.46	0.60	1.41	1.52
Emp:Nonfarm	0.95	1.29	0.71	0.83	1.22	0.66	0.73	1.19	0.94
PCED_LFE	0.80	0.90	1.29	1.15	0.58	0.87	0.69	0.66	0.78
Hstarts	1.35	1.47	2.22	1.48	1.19	0.81	0.94	1.21	1.47
Real Price:Oil	2.08	1.62	7.71	3.99	2.00	2.60	3.52	1.20	1.57
FedFunds	1.47	2.69	1.81	1.20	1.01	0.51	0.74	3.12	3.26
Yield Spread	1.08	0.91	5.04	2.43	1.40	0.83	1.05	0.99	0.81
CP_Tbill Spread	1.07	1.42	2.08	0.79	0.46	1.02	0.83	1.31	2.03
S&P: indust	1.78	1.69	2.81	1.57	1.95	1.33	1.48	1.45	1.11

Median Relative RMSE by category

Category	N	1959-2007	1984-2007	Recession Beginning in						
				1960:2	1969:4	1973:4	1980:1	1981:3	1990:3	2001:1
NIPA	20	0.96	1.28	0.84	0.83	0.71	0.78	0.98	1.32	1.32
IP	12	1.16	1.46	1.08	0.86	0.73	0.88	1.00	1.52	1.83
Emp/Unemp	43	0.87	0.99	0.86	0.88	0.87	0.86	0.84	1.18	0.86
Orders/Inv/Sales	8	1.23	1.28	0.90	0.93	0.70	0.89	0.84	1.20	1.02
Prices	36	1.41	1.32	1.65	2.12	1.15	1.00	1.54	1.28	1.81
Earning/Productivity	11	1.13	1.14	0.97	1.70	0.82	0.90	0.93	1.47	1.06
Hous.Starts	7	1.73	1.75	2.26	1.48	1.59	1.63	1.51	1.81	1.65
Int. Rates	14	1.07	1.21	1.74	1.31	0.99	0.48	0.69	1.85	1.32
Money&Credit	11	1.78	1.54	2.35	2.09	1.42	1.46	1.67	1.86	1.72
StockPrices&Wealth	12	1.43	1.36	2.05	1.54	1.23	1.39	1.25	1.41	1.13
Housing Prices	4	1.75	1.75	.	.	.	1.84	2.66	1.92	2.01
Exch.Rates	5	1.30	1.09	1.84	1.72	1.07	1.08	1.25	1.17	0.94

(a) Are the u_{it} shocks unusually large in this recession?

No (with exceptions, particularly in the financial sector).

(b) Are there important common shocks in this recession that were not evident previously?

Let $\gamma_{i,\tau}$ denote the ordered eigenvalues of $\Gamma_\tau = \sum_{t=\tau}^{\tau+7} \hat{u}_t \hat{u}_t'$ (a sample covariance matrix over 8 observations),

$$\text{Let } \kappa_\tau = \frac{\gamma_{1,\tau}}{\sum_{i=1}^8 \gamma_{i,\tau}}.$$

κ will be large if u is dominated by single shock.

Is κ unusually large during this recession?

Values of κ in different recessions

1960:2	1969:4	1973:4	1980:1	1981:3	1990:3	2001:1	2007:4
0.56	0.71	0.74	0.68	0.58	0.61	0.64	0.50

The value in 2007:4 (0.50) corresponds to the 5th percentile of the empirical distribution of κ in the sample (where κ is computed over all 8 quarter periods.)

(b) Are there important common shocks in this recession that were not evident previously?

No.

Question 1: Is 2008-09 associated with the same common shocks η_t that have been important in the past? Or, are new common or idiosyncratic shocks needed to explain 2008-09?

There are precedents for this recession's shocks in the 1960-2007 data.

Question 2: $Y_t = \Lambda(L)\eta_t + u_t$. Did $\Lambda(L)$ change?

In DFM : $Y_{it} = \lambda_i' F_t + u_{it}$ and $\Phi(L)F_t = H\eta_t$

so that

$$Y_{it} = \lambda_i \Phi(L)^{-1} H \eta_t + u_{it}$$

End of Sample period is short

Andrews (2003) “End-of-Sample Instability Test”

The test compares in-sample and end-of-sample SSR using bootstrap simulations to compute critical value.

$$Y_{it} = \lambda_i' F_t + u_{it} \text{ and } \Phi(L)F_t = H\eta_t$$

1. Are there important change in λ ?

Andrews EOS Tests for factor loadings

P-values for Test Statistics under the null of no change

Series	Sample Period Start Date	
	1959	1984
GDP	0.54	0.23
Emp:Nonfarm	0.57	0.63
Core PCE Inflation	0.52	0.67
Hstarts	0.13	0.49
Real Price:Oil	0.01	0.00
FedFunds	0.06	0.05
Yield Spread	0.46	0.65

CP_Tbill Spread	0.32	0.26
S&P500	0.03	0.28

Fraction of series with p-values less than 5%

Category	Number of series	Sample Start Date	
		1959	1984
NIPA	20	0.10	0.25
IP	12	0.17	0.25
Emp/Unemp	43	0.02	0.14
Orders/Inv/Sales	8	0.13	0.13
Prices	37	0.32	0.19
EmpEarning/Productivity	11	0.00	0.00
Hous.Starts	7	0.00	0.00
Int. Rates	15	0.13	0.40
Money&Credit	12	0.42	0.17
StockPrices&Wealth	12	0.33	0.17
Exch.Rates	5	0.00	0.00

$$Y_{it} = \lambda_i' F_t + u_{it} \text{ and } \Phi(L)F_t = H\eta_t$$

2. Are there important change in Φ or $\Sigma = \text{var}(H\eta_t)$?

Break Tests 1959:3 – 1983:4 and 1984:1 – 2007:3

Φ ... p-value = 0.00, Σ p-value = 0.00

Andrews end-of-sample break test (2007:III →)

Relative to 1959-2007:3 period: p-value = 0.00

Relative to 1984-2007:3 period: p-value = 0.07

Question 2: Did $\Lambda(L)$ change?

$$Y_{it} = \lambda_i' F_t + u_{it}$$

$$\Phi(L)F_t = H\eta_t$$

$$\Lambda(L) = \lambda_i \Phi(L)^{-1} H$$

Yes ... but little instability in λ

... source of instability is F process.

Question 3: Can the important shocks be associated with standard channels (wealth effects, oil prices, credit, etc.) ?

Framework ... $\Phi(L)F_t = \varepsilon_t = H\eta_t$

$$\eta_t = G\varepsilon_t \text{ with } G = H^{-1}$$

Thus $\eta_{jt} = g_j'\varepsilon_t$, where g_j' is the j 'th row of G .

Some shocks we will attempt to identify:

1. Oil (Hamilton and Killian)
2. Fed Funds (large VAR literature)
3. Wealth (permanent shocks as in Lettau-Lydvigson)
4. Credit disruptions (using credit spreads as in Bernanke, Friedman/Kuttner, Kashyap/Stein/Wilcox and others)
5. Uncertainty (Bloom)

Identification uses two kinds of observables

Z_t : Variables that are correlated with η_{jt} but uncorrelated η_{it} for $i \neq j$. (Example: OPEC supply shortfall (Killian) as an instrument for oil price shock).

W_t : Variables that are uncorrelated with η_{jt} but correlated with η_{it} for some $i \neq j$. (Example: Innovations to variables that are assumed not to respond to monetary policy shocks within the quarter as in Wold causal ordering.)

We will identify shocks one at a time and show their effects.

(But note, shocks may be correlated)

Some shocks

Oil: Killian (2008) identification

$$Z_t = \{OPEC_t, OPEC_{t-1}\}$$

$$W_t = 0$$

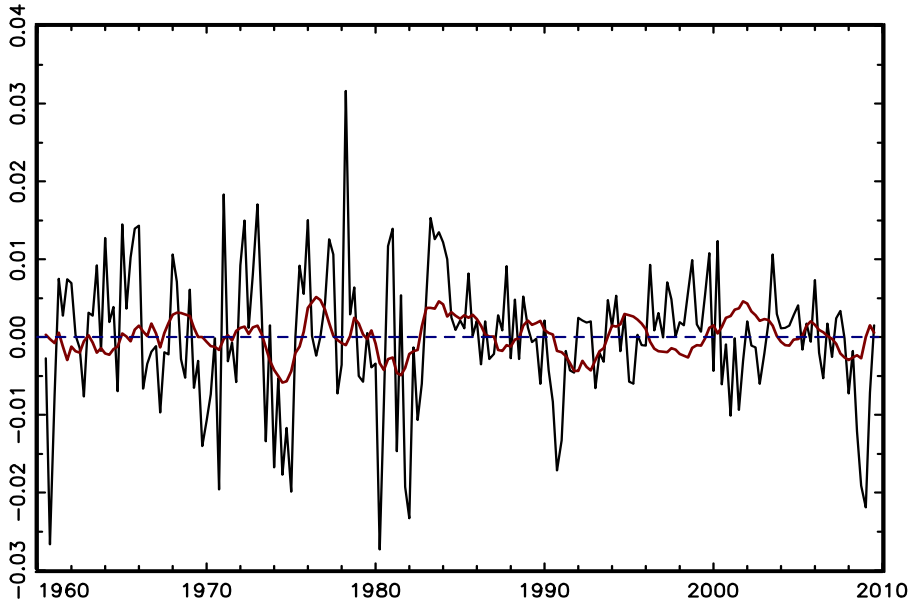
Oil: Hamilton (2003) identification

$$Z_t = \mathbf{1}(Poil_t \geq \max\{Poil_{t-j}\}_{j=1}^{12(\text{quarters})}) \times \Delta Poil_t$$

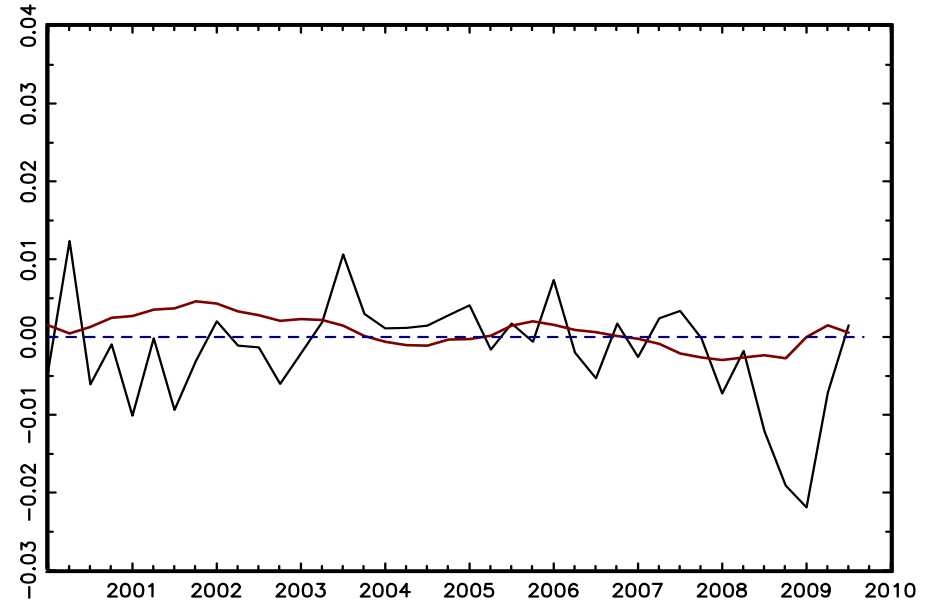
$$W_t = 0$$

Killian identification

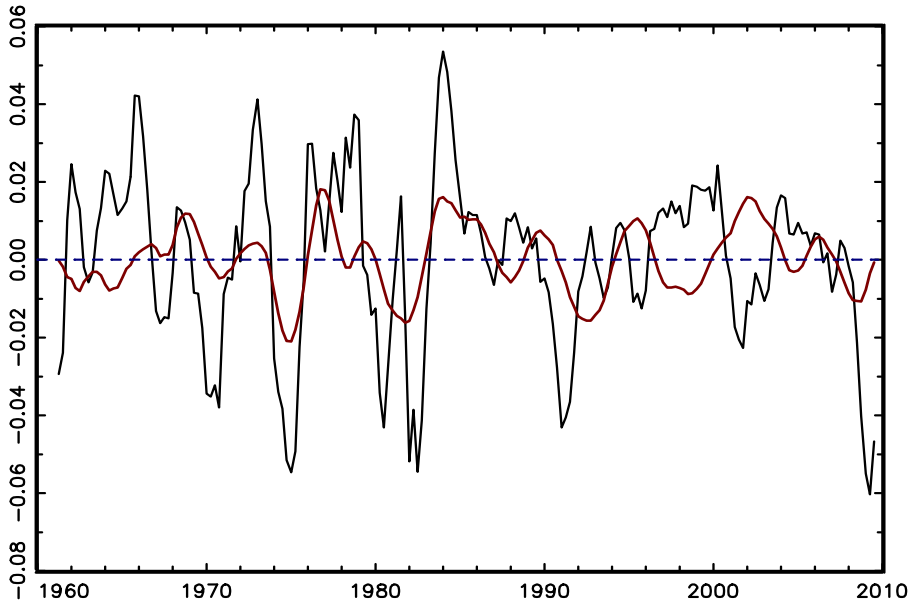
GDP



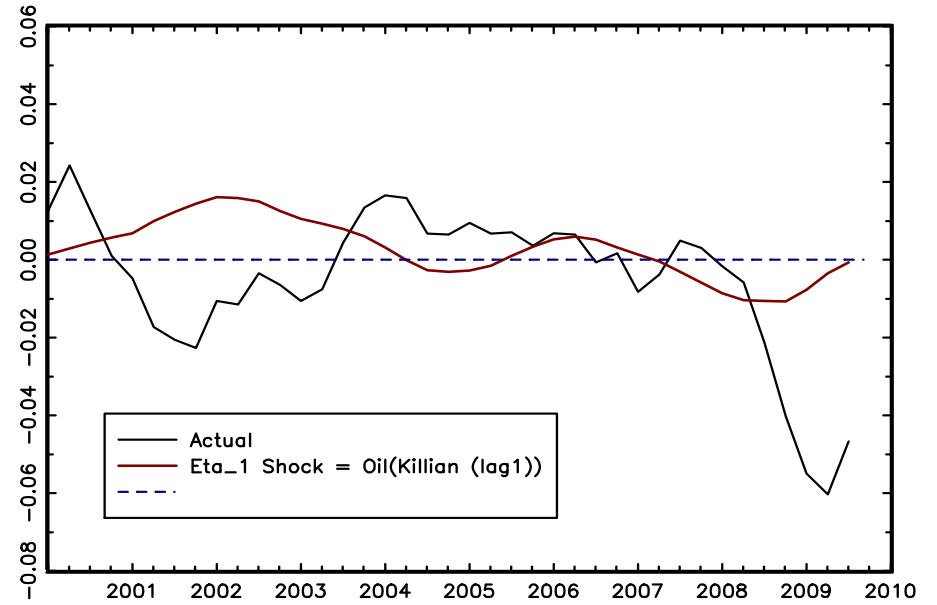
GDP



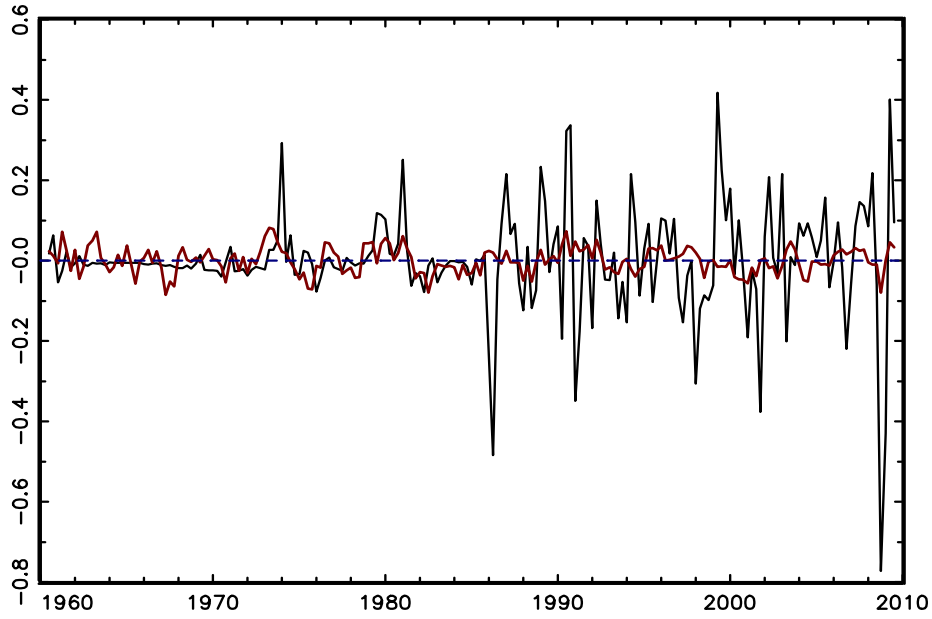
Year-Over-Year



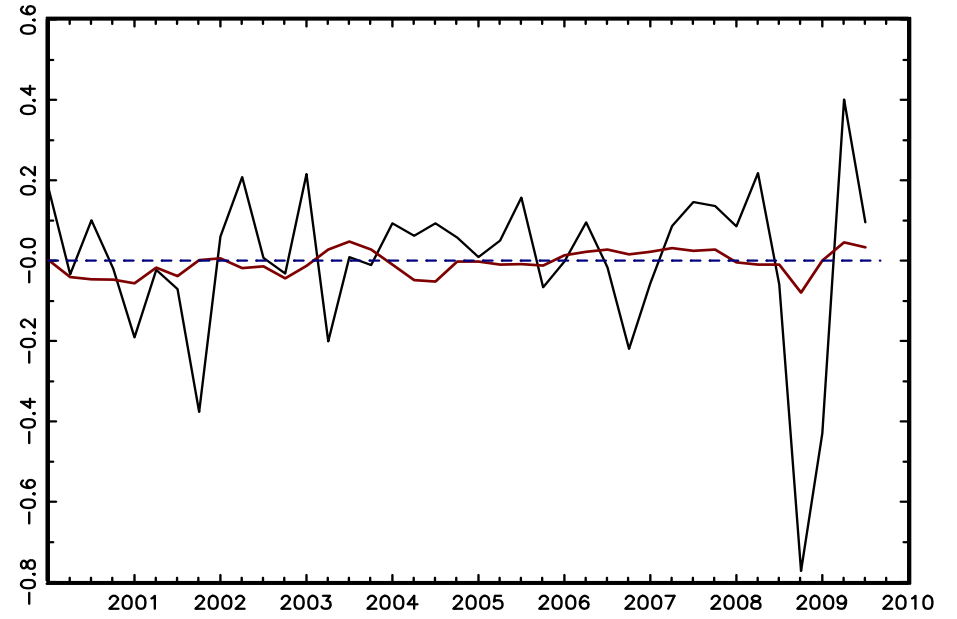
Year-Over-Year



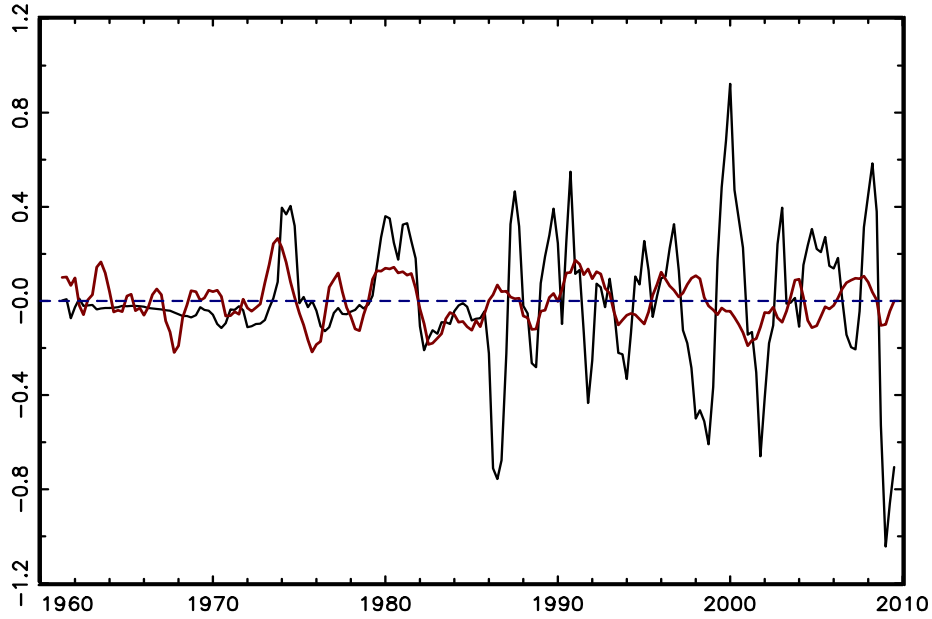
Real Price:Oil



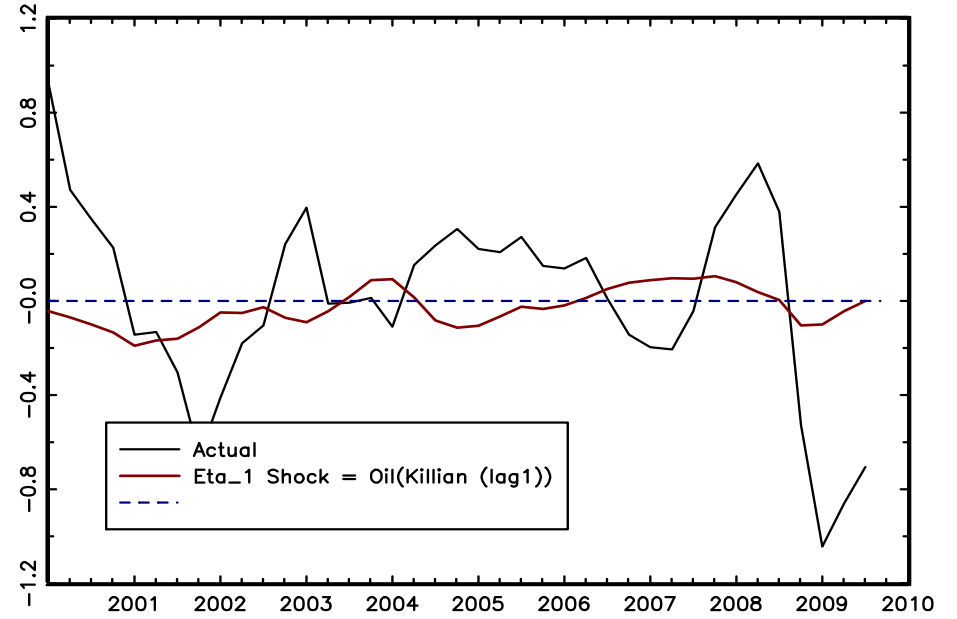
Real Price:Oil



Year-Over-Year

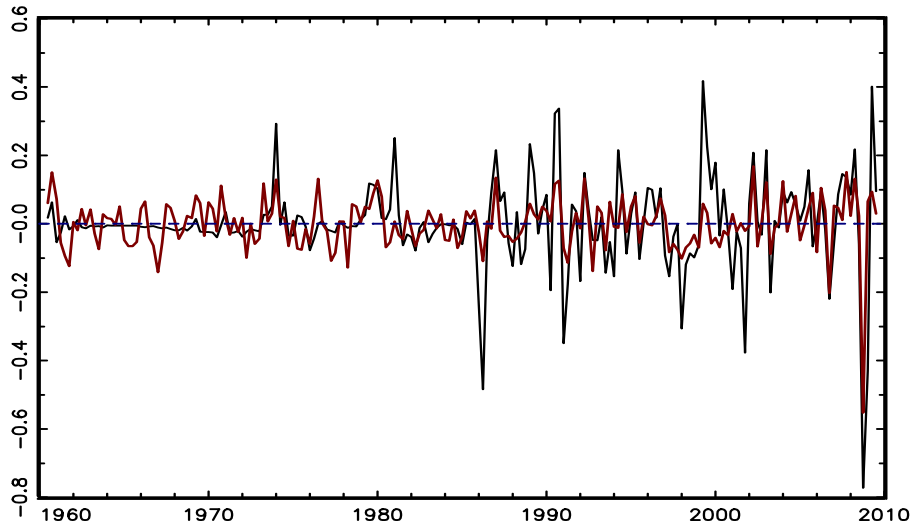


Year-Over-Year

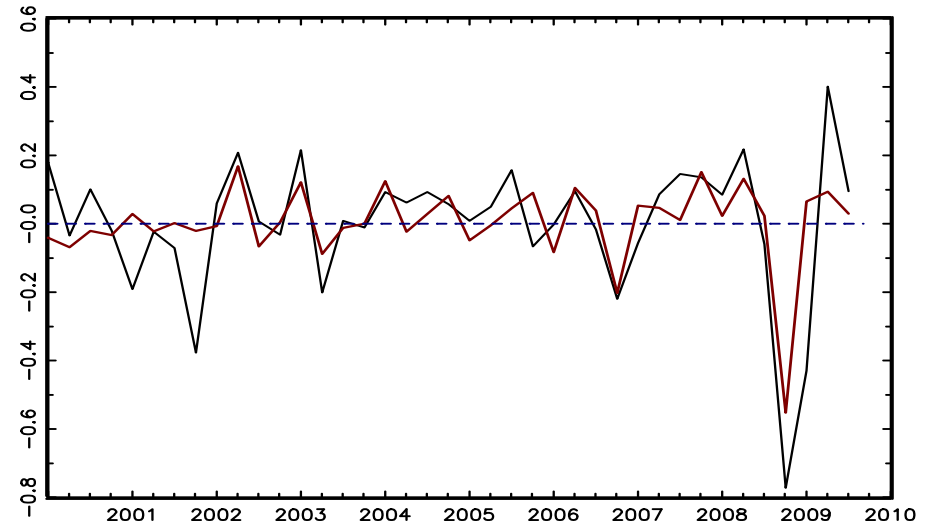


Hamilton identification

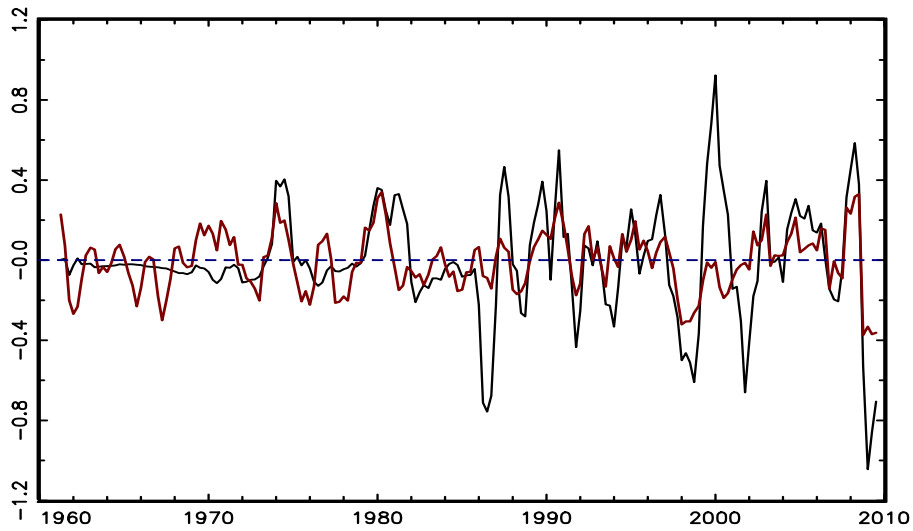
Real Price:Oil



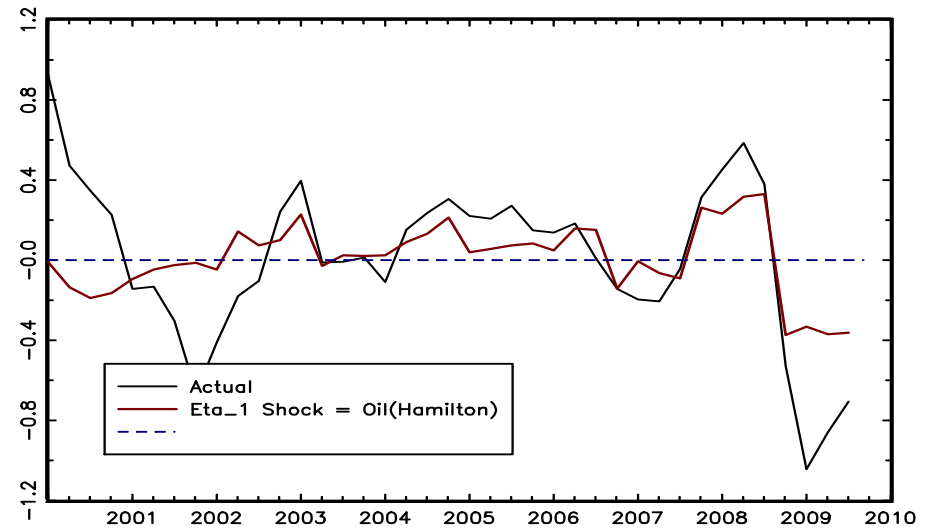
Real Price:Oil



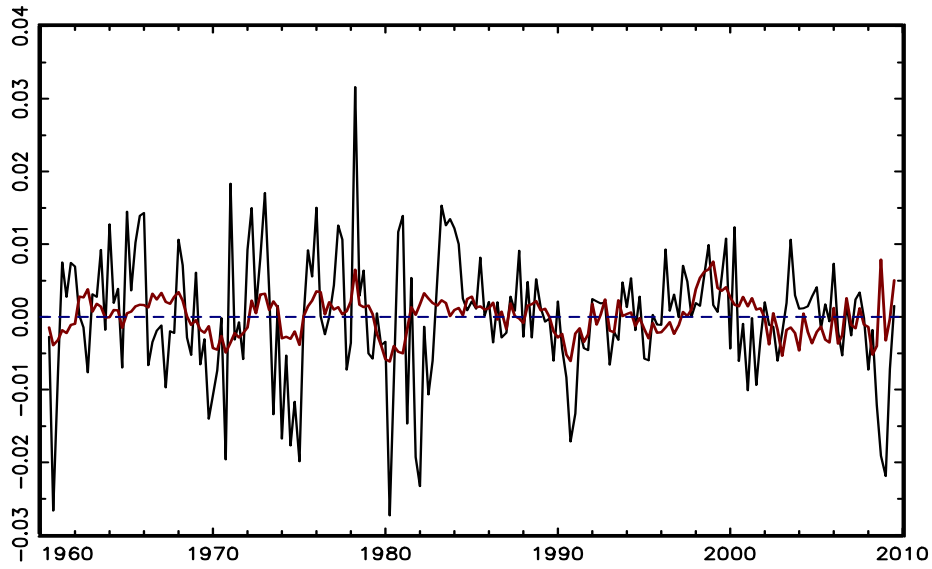
Year-Over-Year



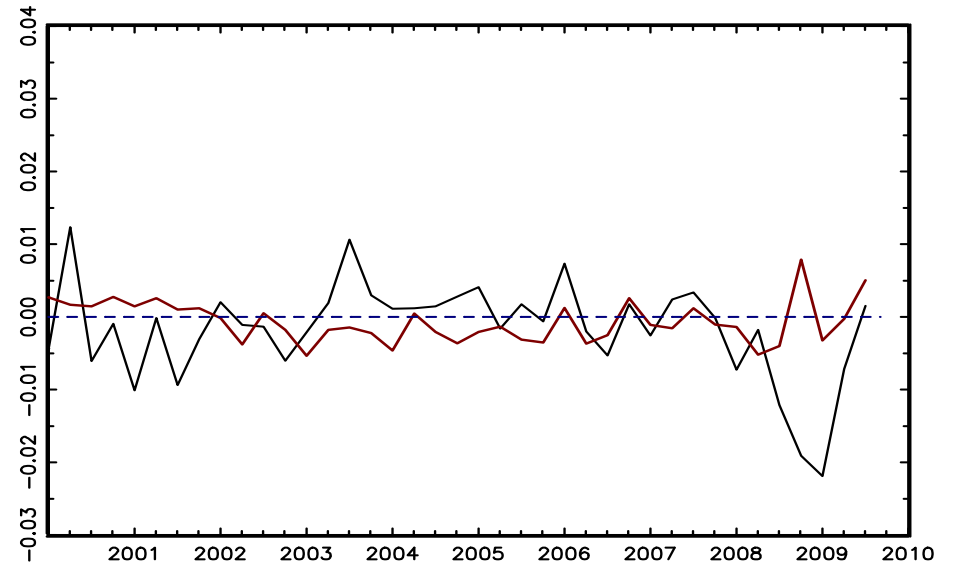
Year-Over-Year



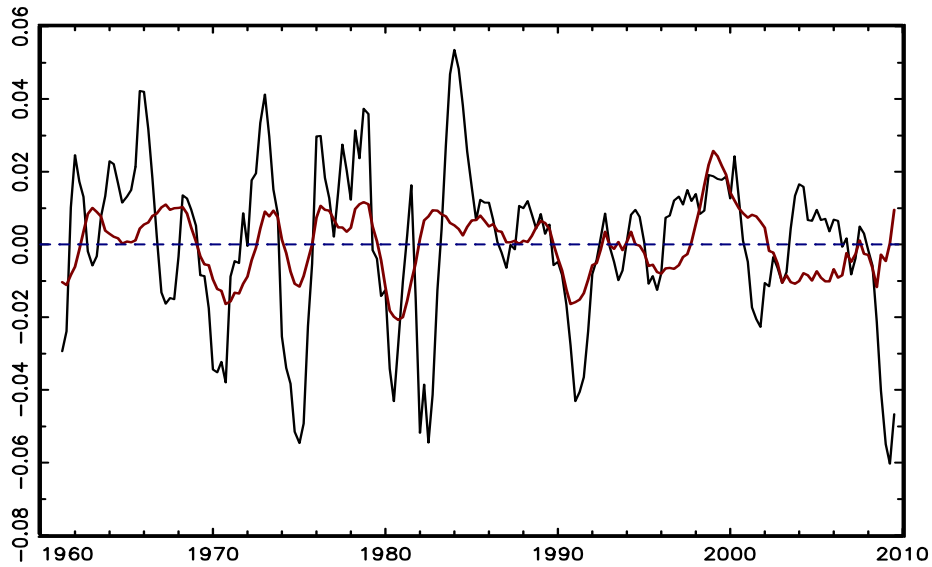
GDP



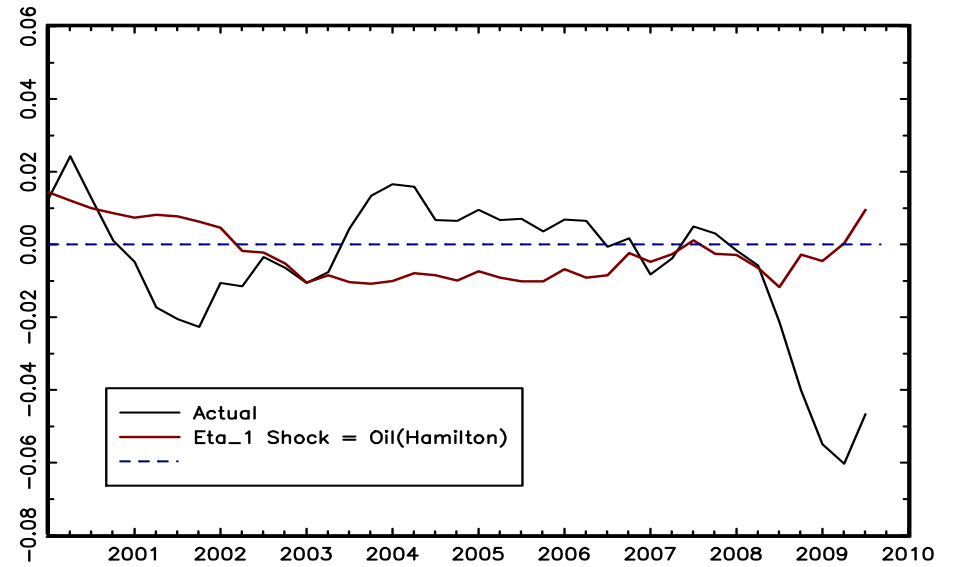
GDP



Year-Over-Year



Year-Over-Year

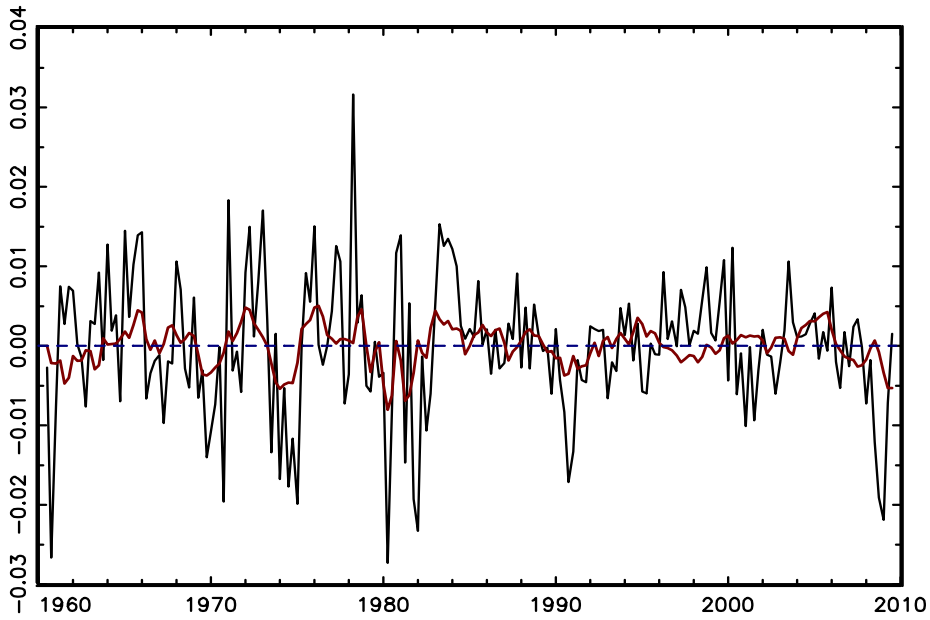


FedFunds: (Vast VAR Literature)

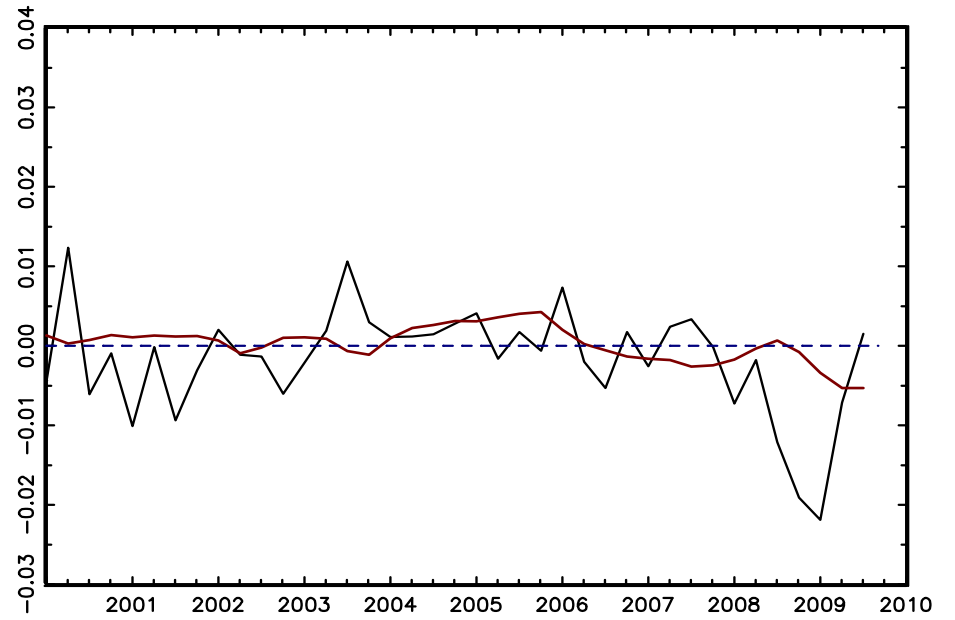
$$Z_t = 0$$

$$W_t = \begin{pmatrix} \lambda'_{\text{GDP}} \\ \lambda'_{\text{CorePCED}} \\ \lambda'_{\text{ComPrices}} \\ \lambda'_{\text{UnempRate}} \end{pmatrix} \varepsilon_t$$

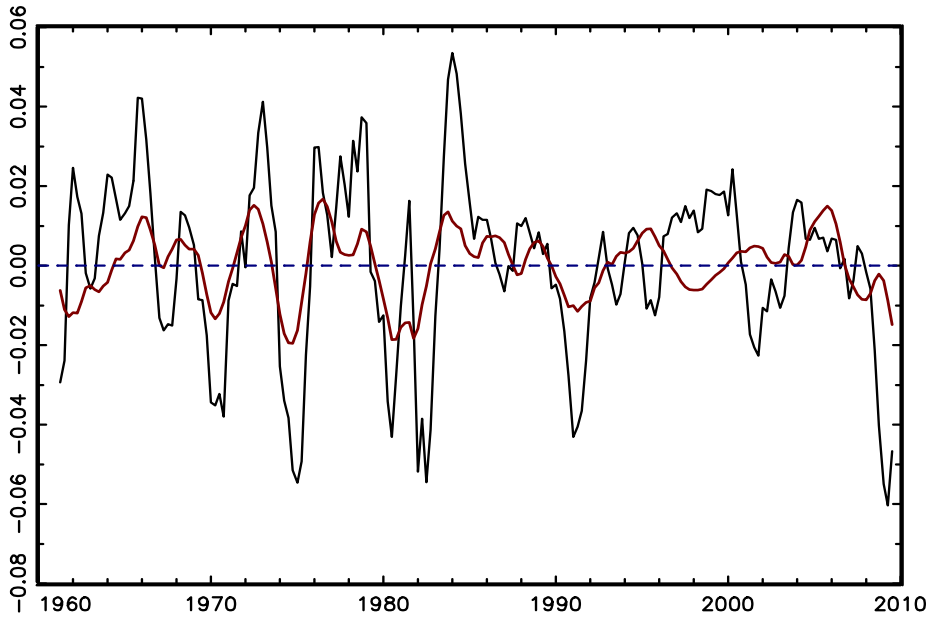
GDP



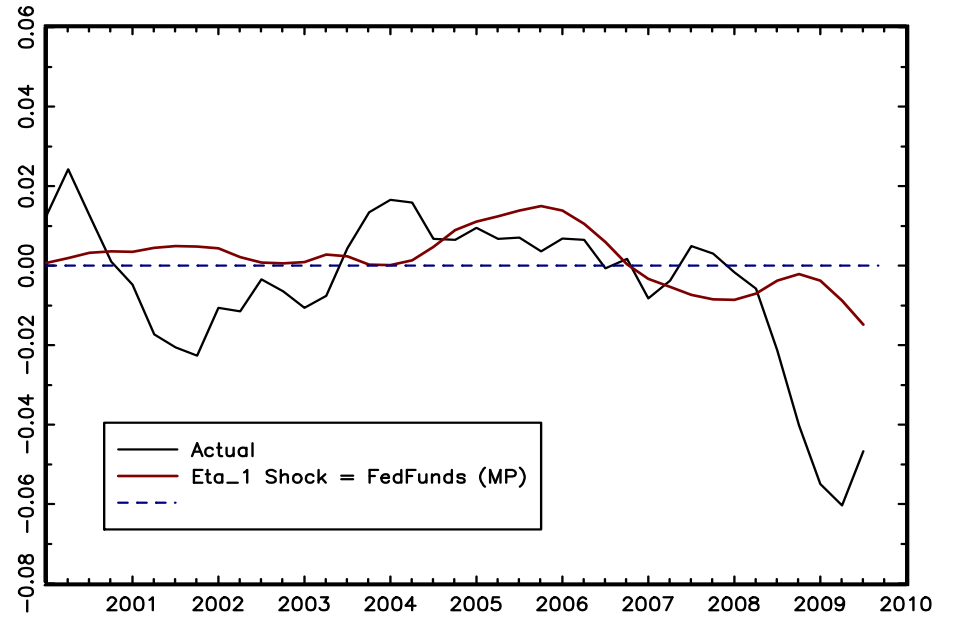
GDP



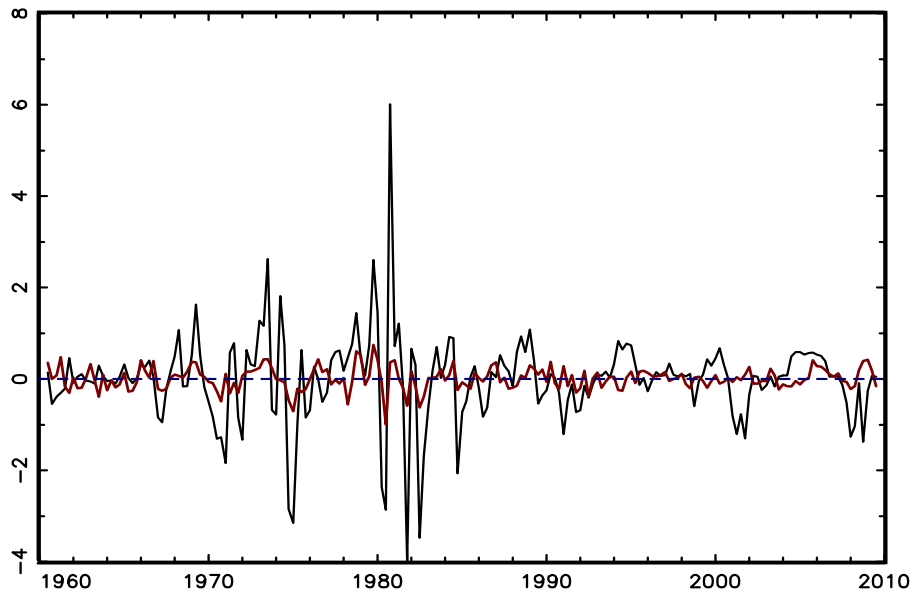
Year-Over-Year



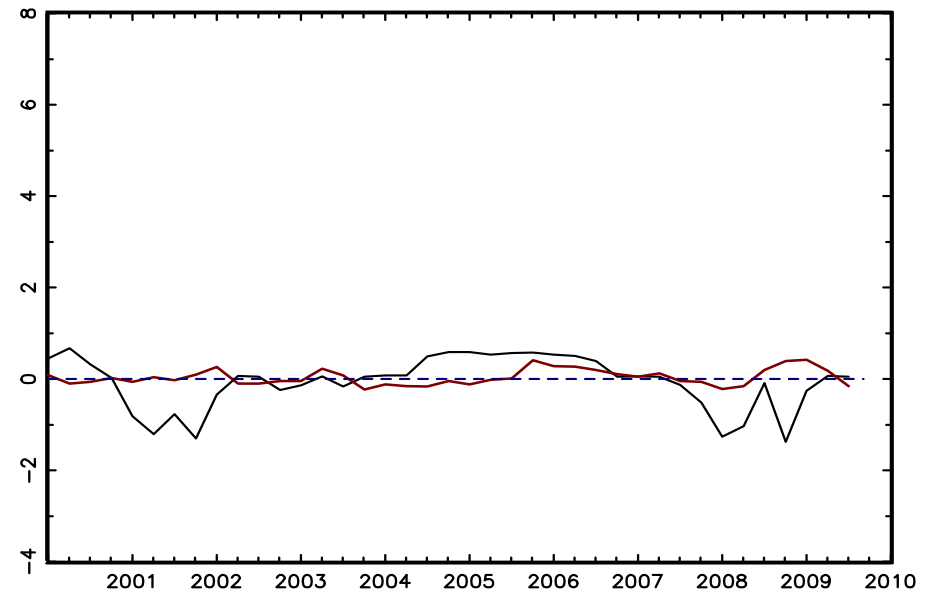
Year-Over-Year



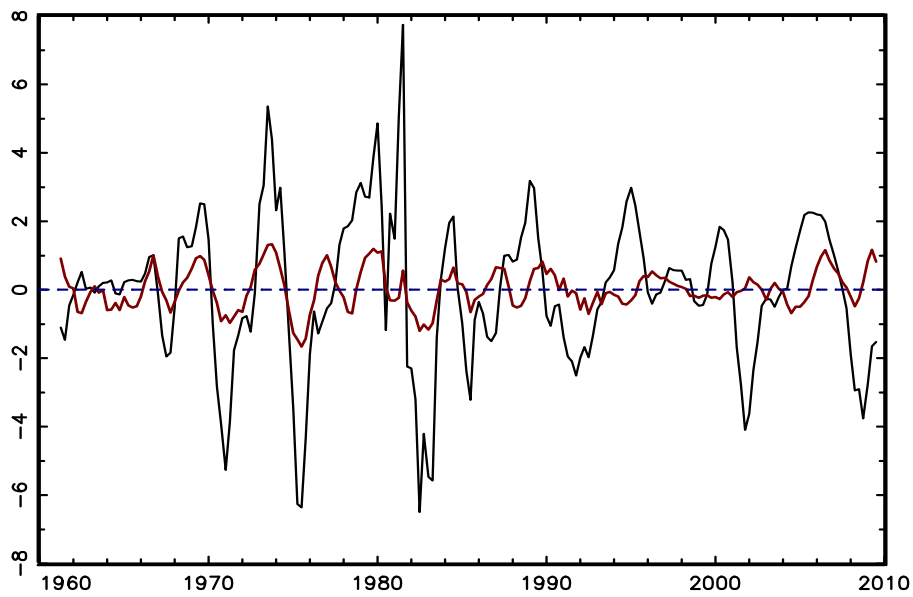
FedFunds



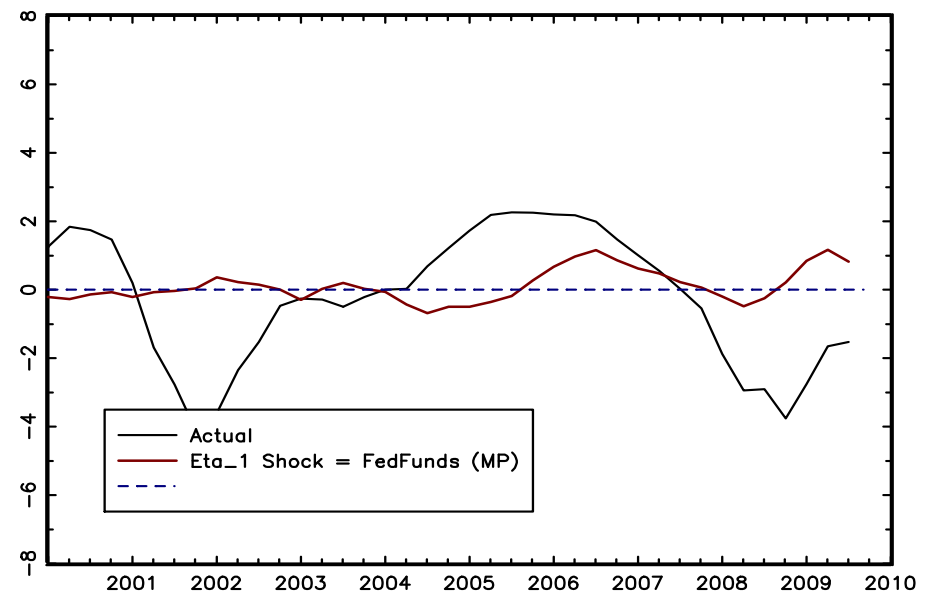
FedFunds



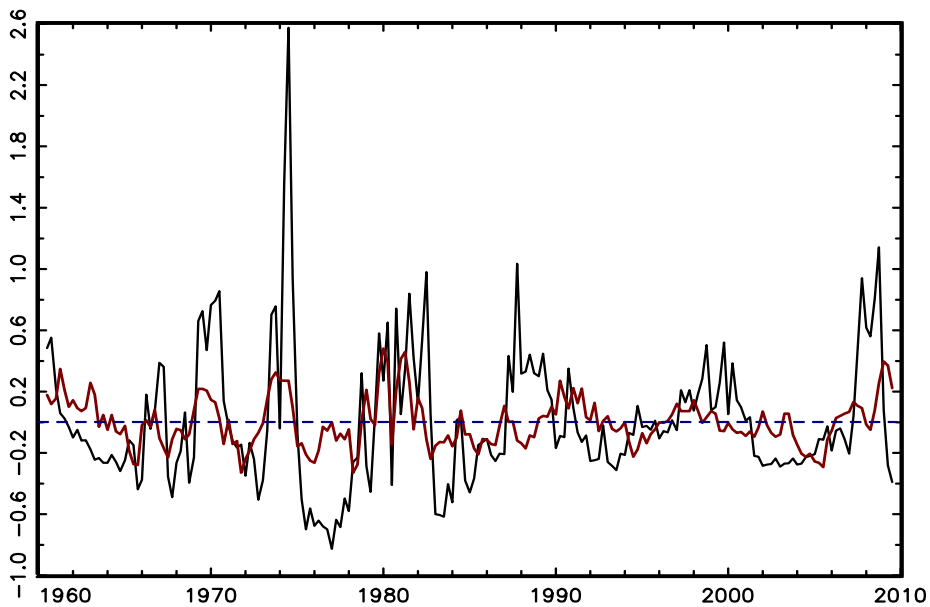
Year-Over-Year



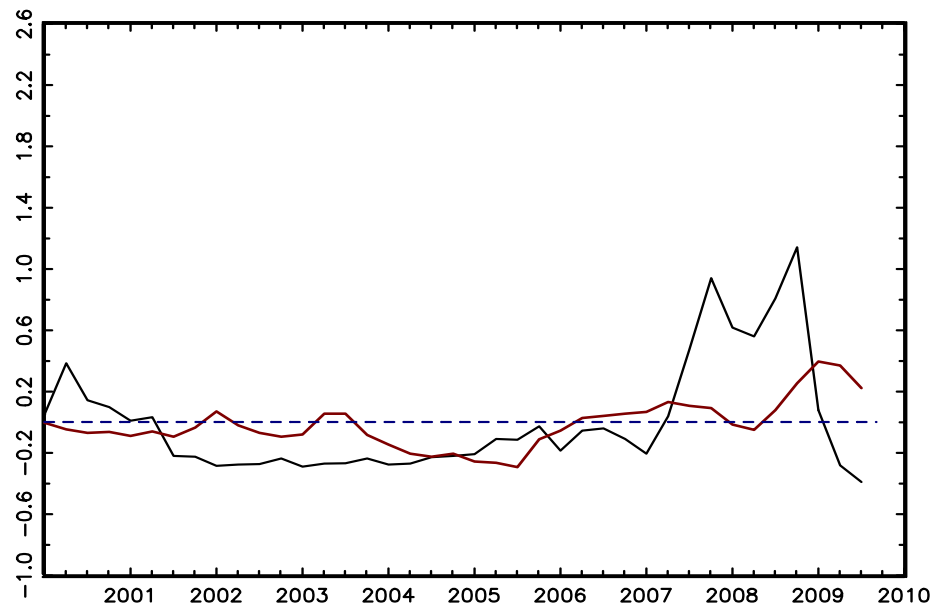
Year-Over-Year



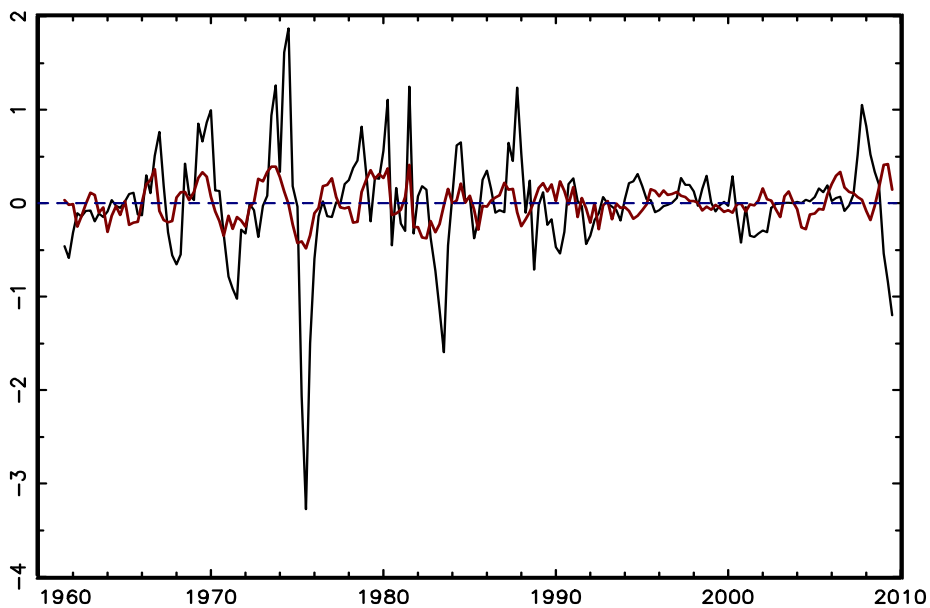
CP_Tbill Spread



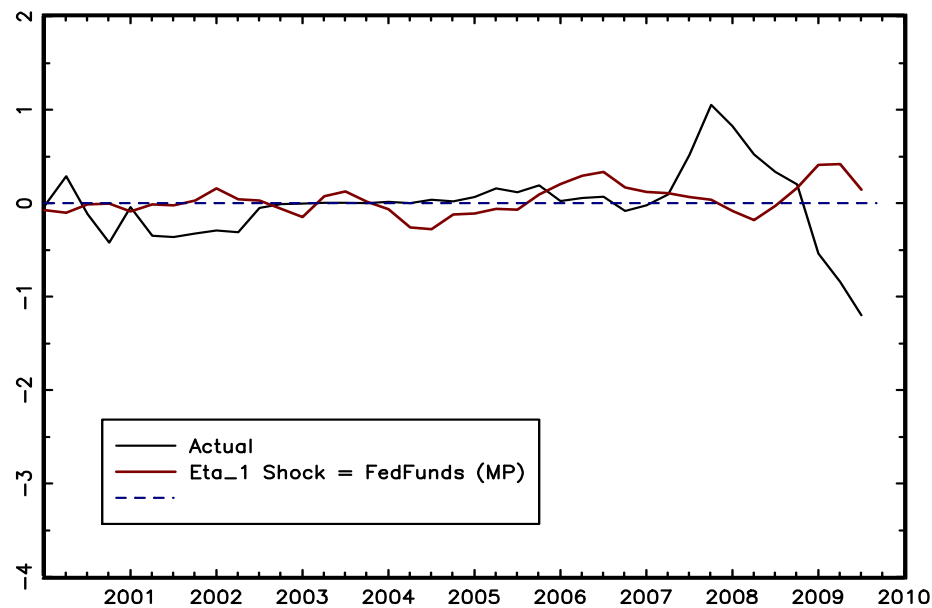
CP_Tbill Spread



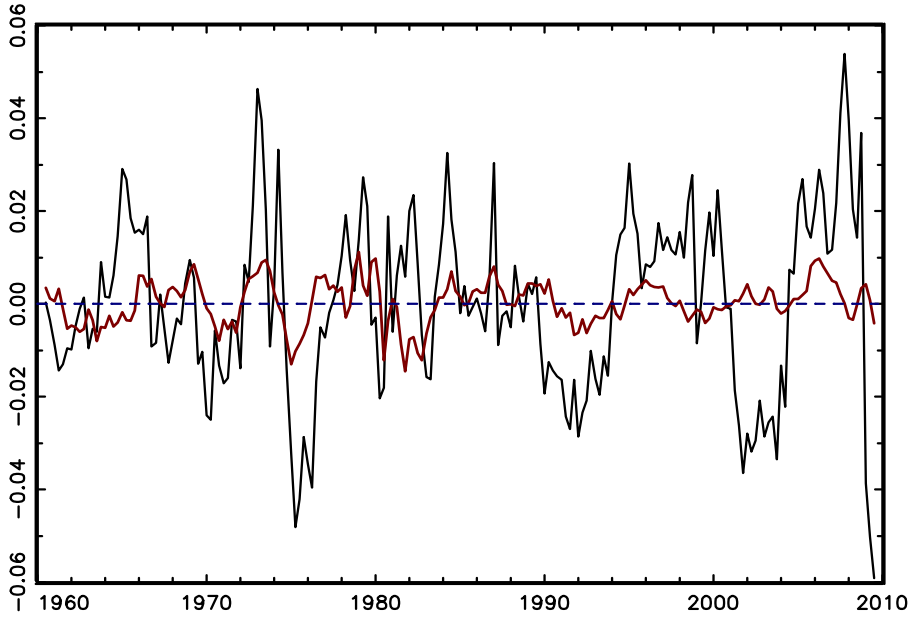
Year-Over-Year



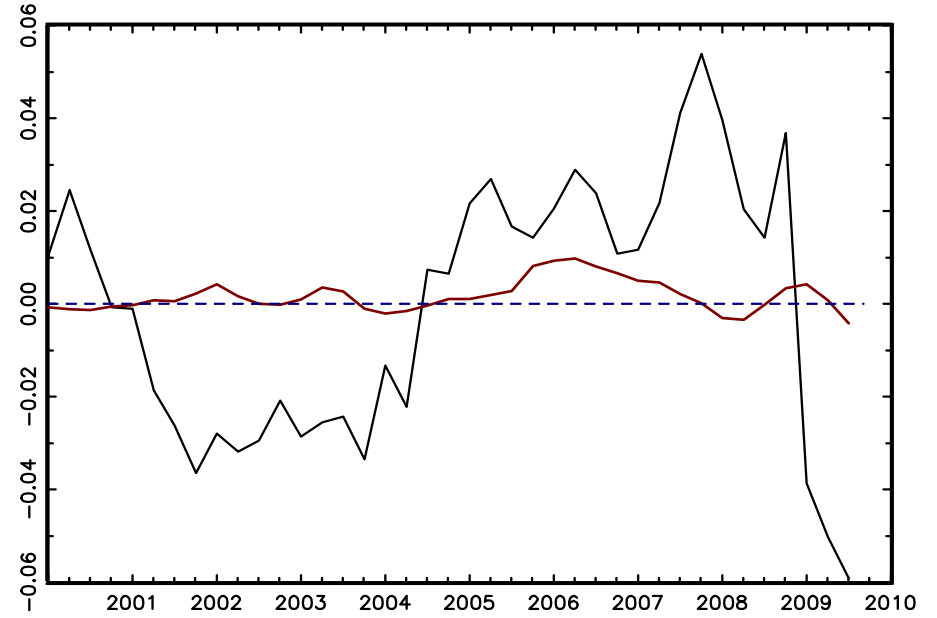
Year-Over-Year



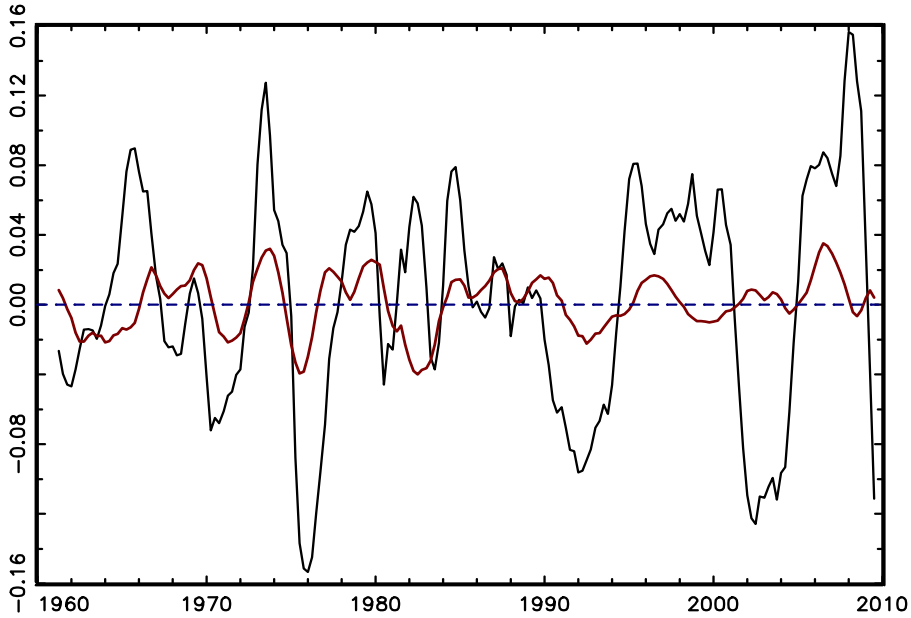
Real C&Lloand



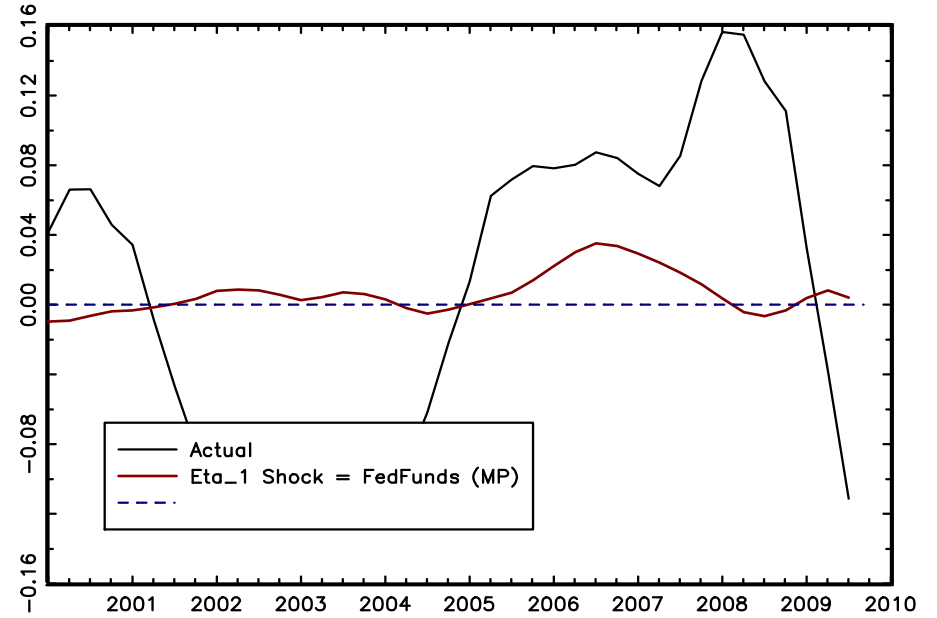
Real C&Lloand



Year-Over-Year



Year-Over-Year



Wealth:

$$\Phi(L)F_t = \varepsilon_t$$
$$\Delta Y_{w,t} = \lambda_w' F_t + u_{w,t}$$

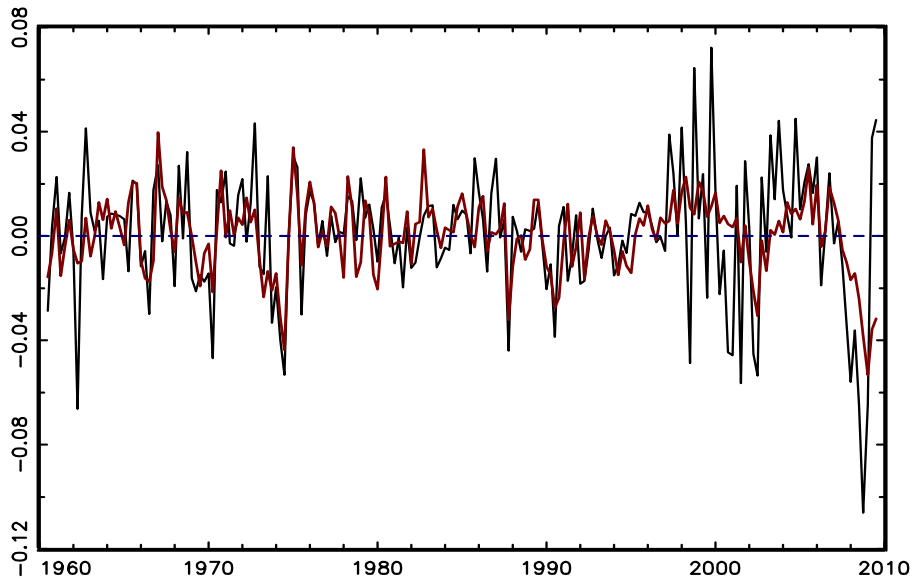
So that shock to permanent wealth is $\lambda_w' \Phi(1)^{-1} \varepsilon_t$

Thus,

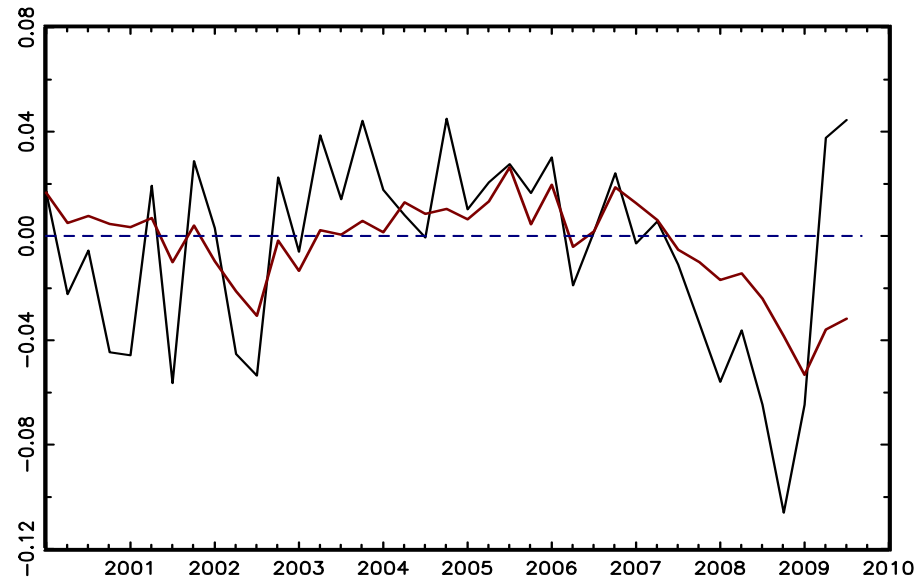
$$Z_t = \lambda_w' \Phi(1)^{-1} \varepsilon_t$$

$$W_t = 0$$

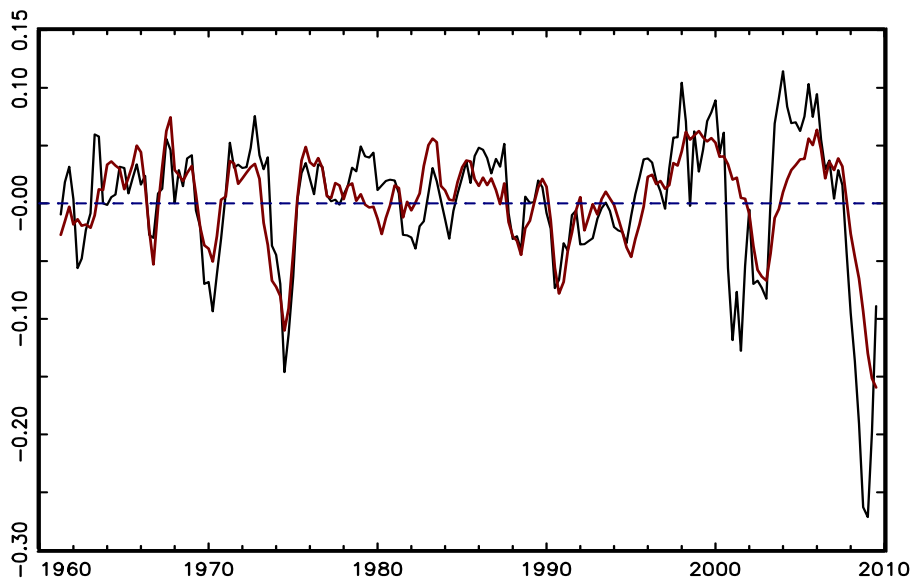
Real HHW:W



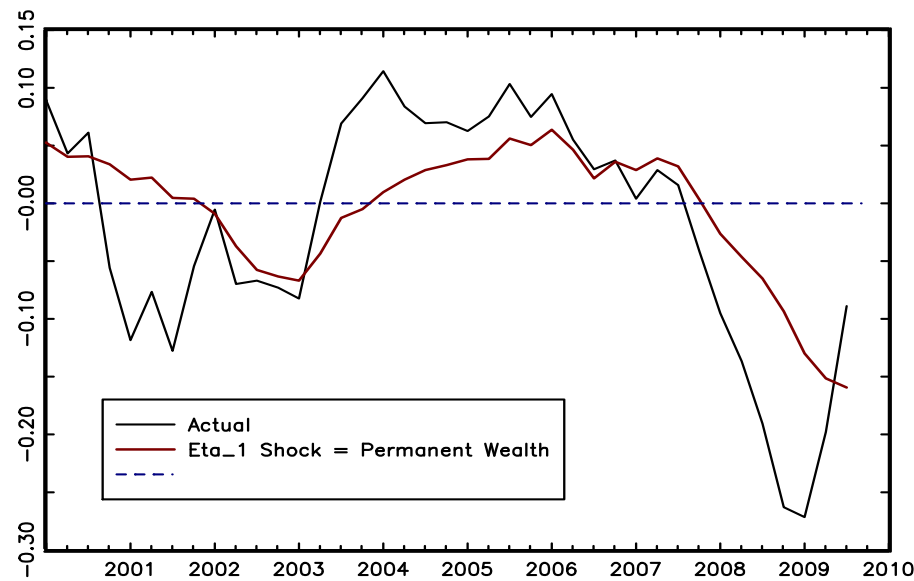
Real HHW:W



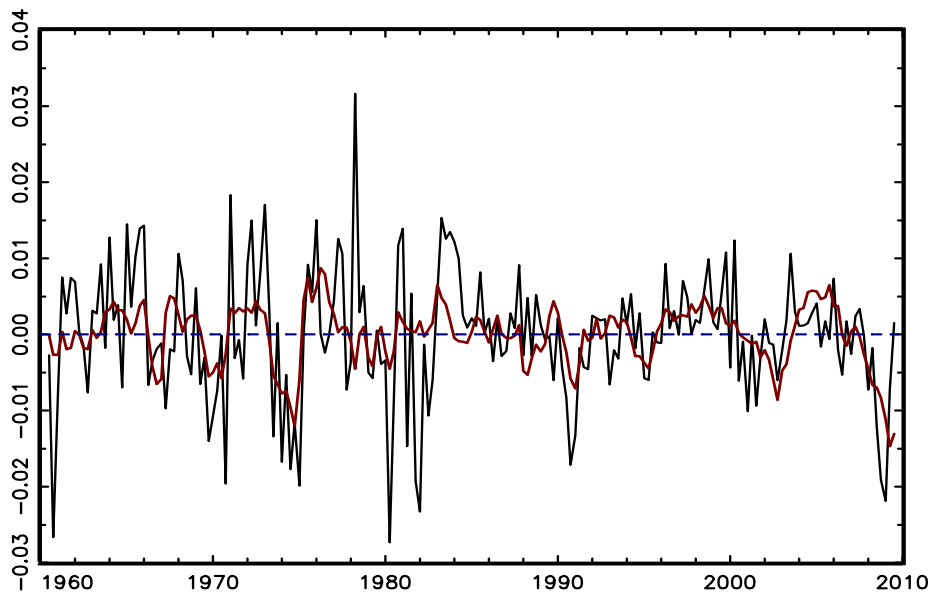
Year-Over-Year



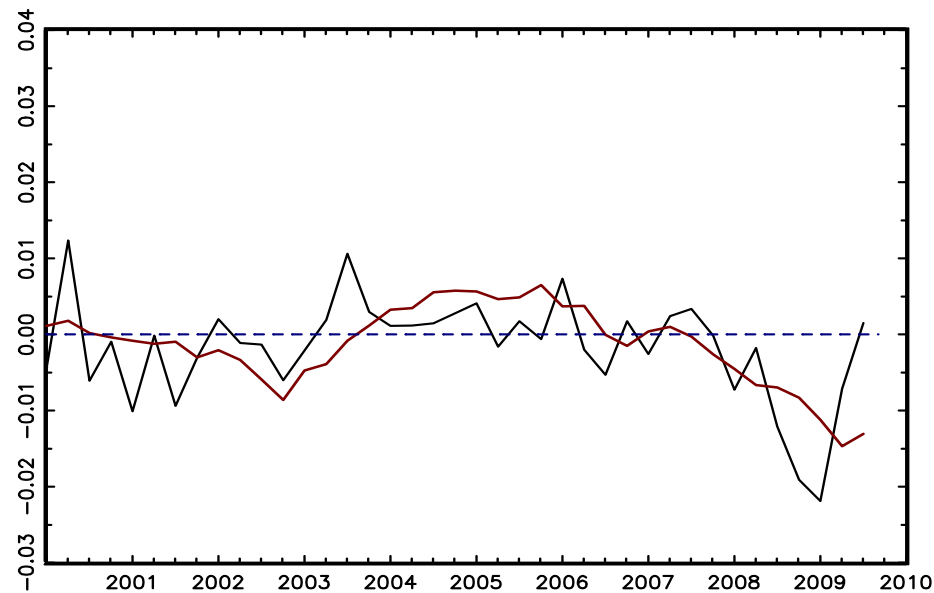
Year-Over-Year



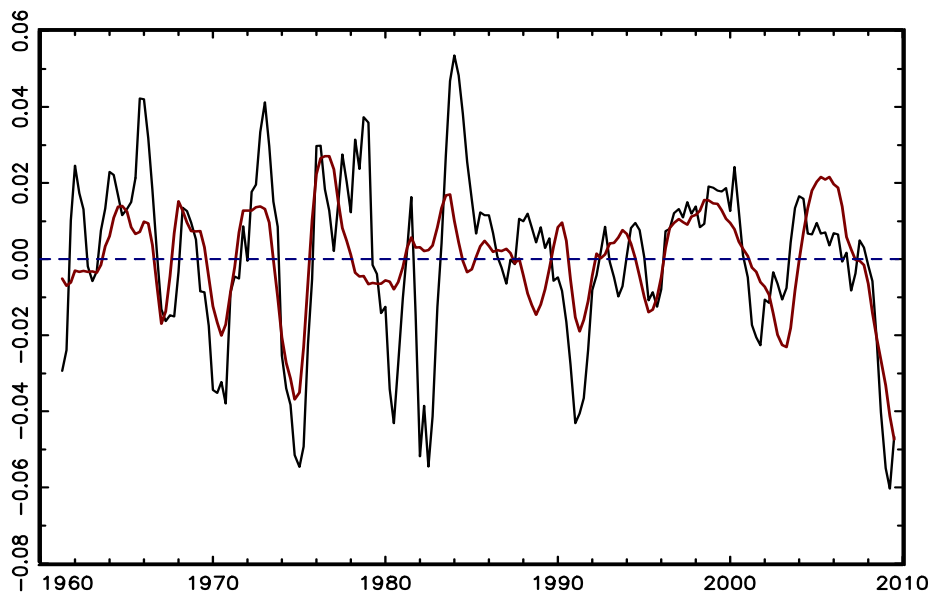
GDP



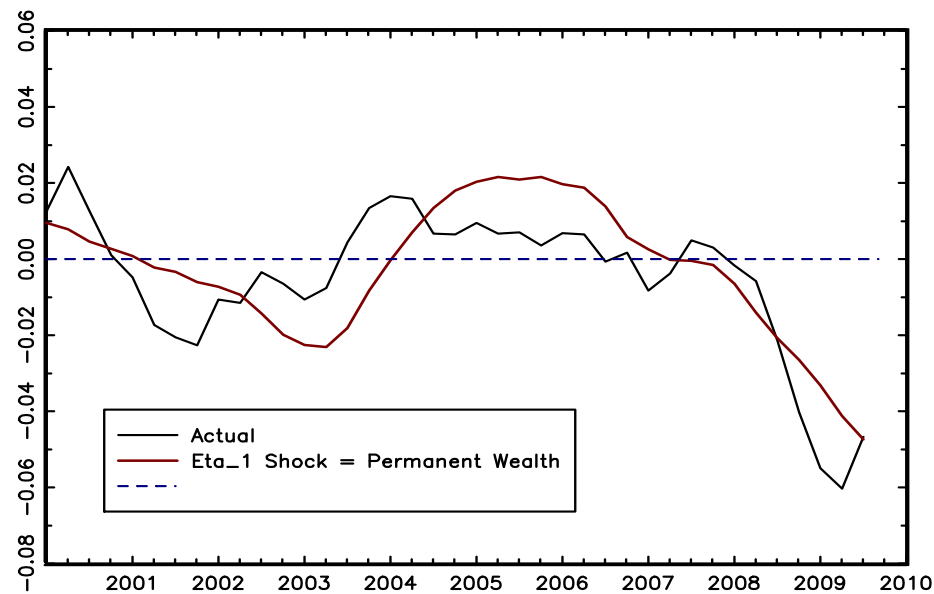
GDP



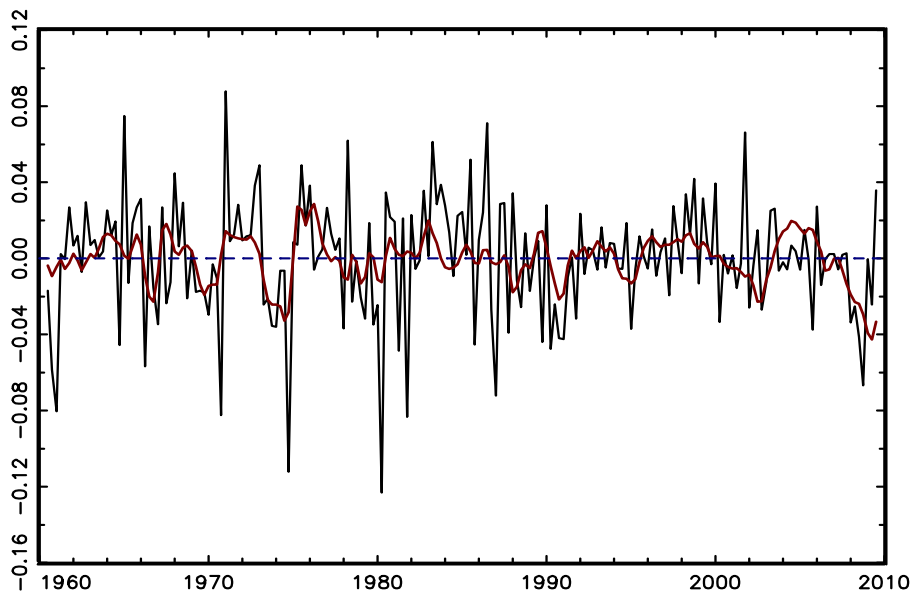
Year-Over-Year



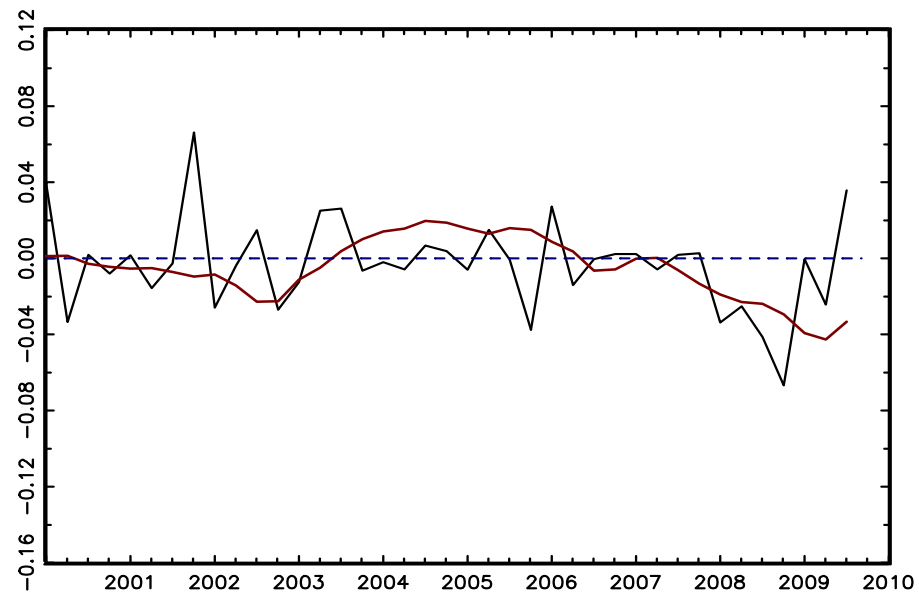
Year-Over-Year



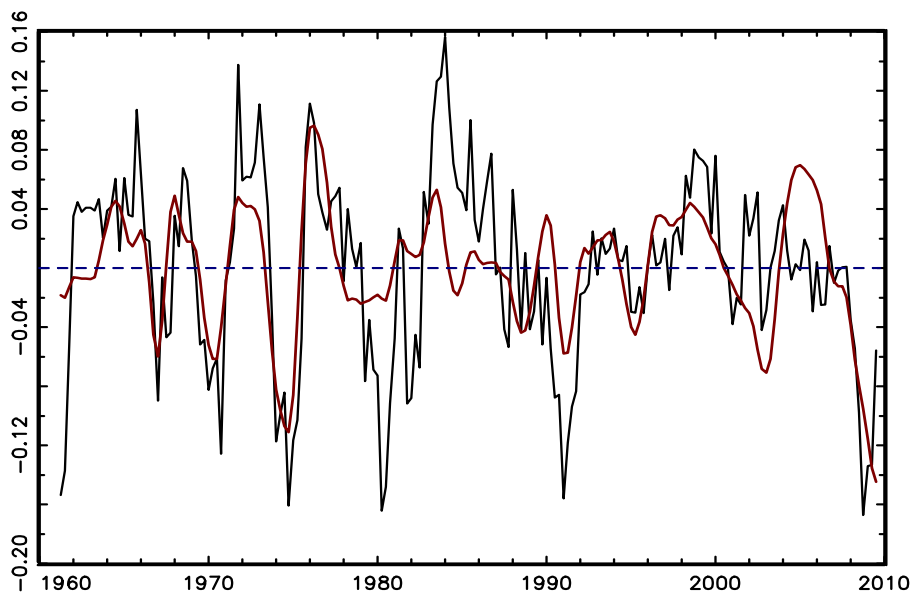
Cons:Dur



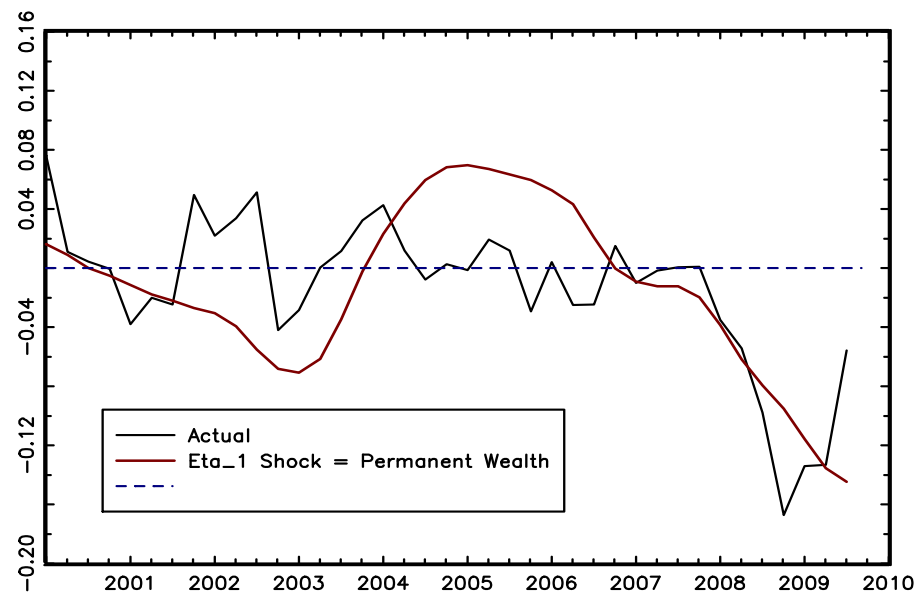
Cons:Dur



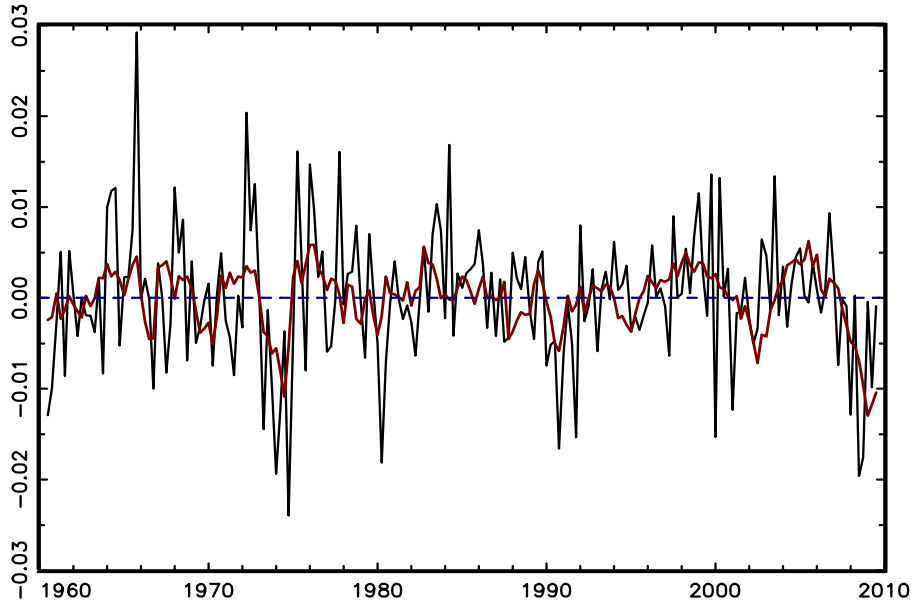
Year-Over-Year



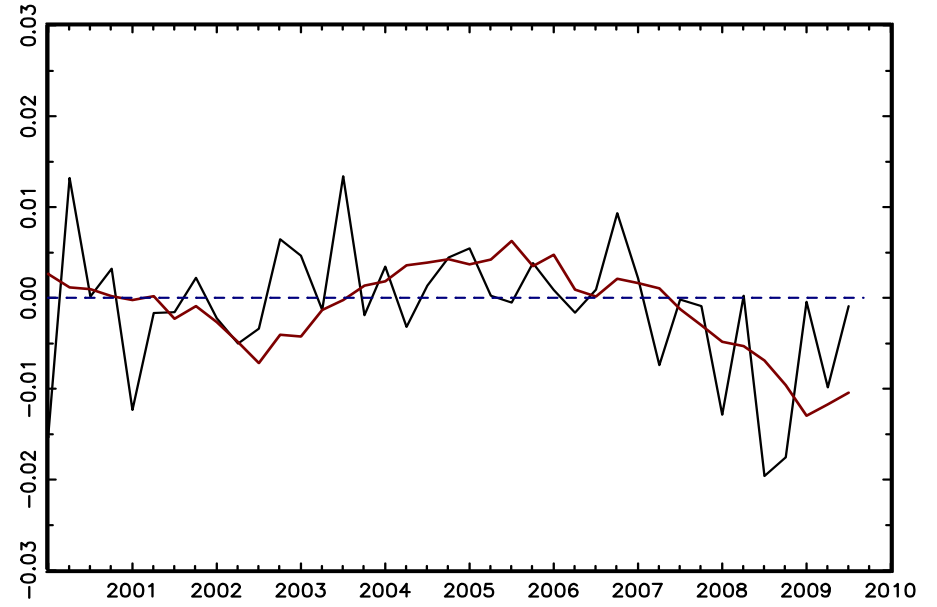
Year-Over-Year



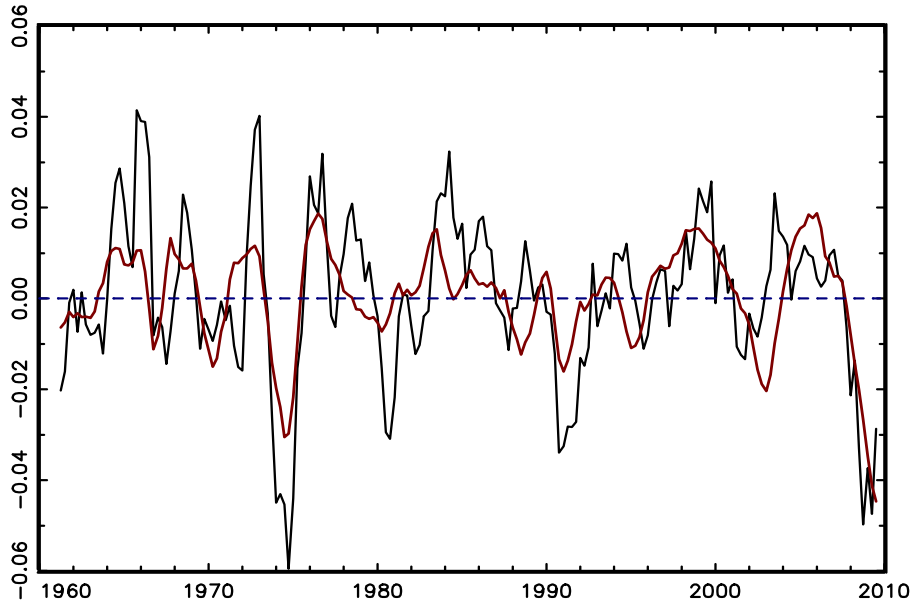
Cons:NonDur



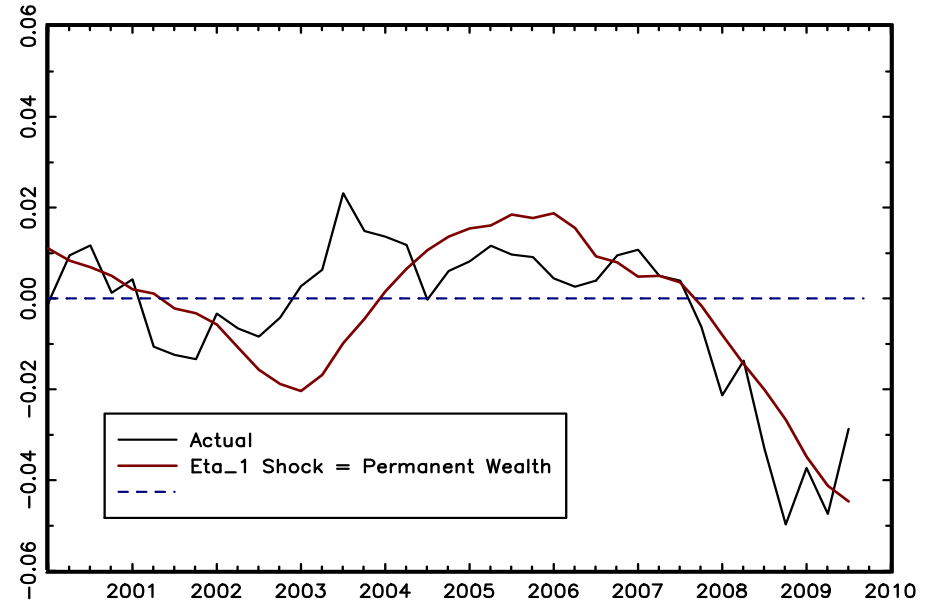
Cons:NonDur



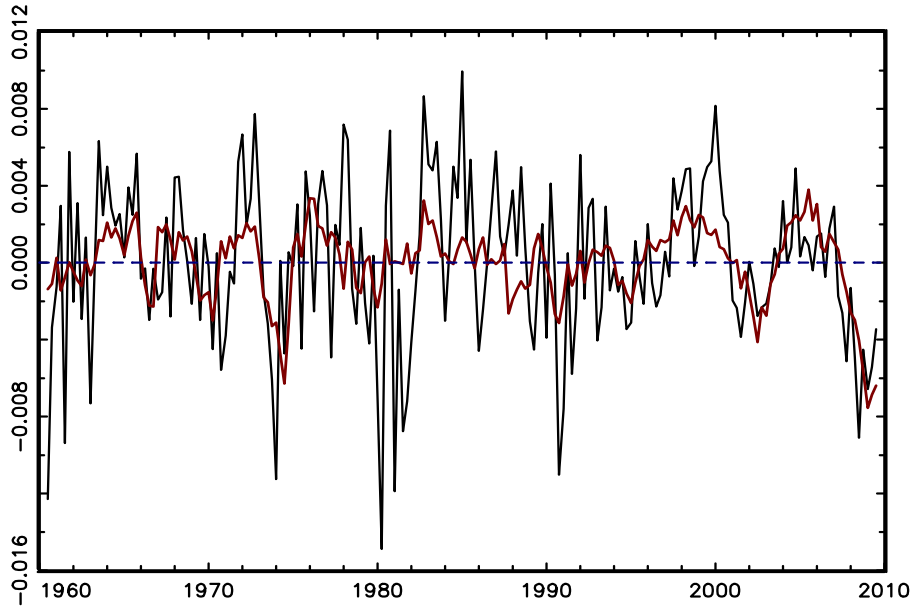
Year-Over-Year



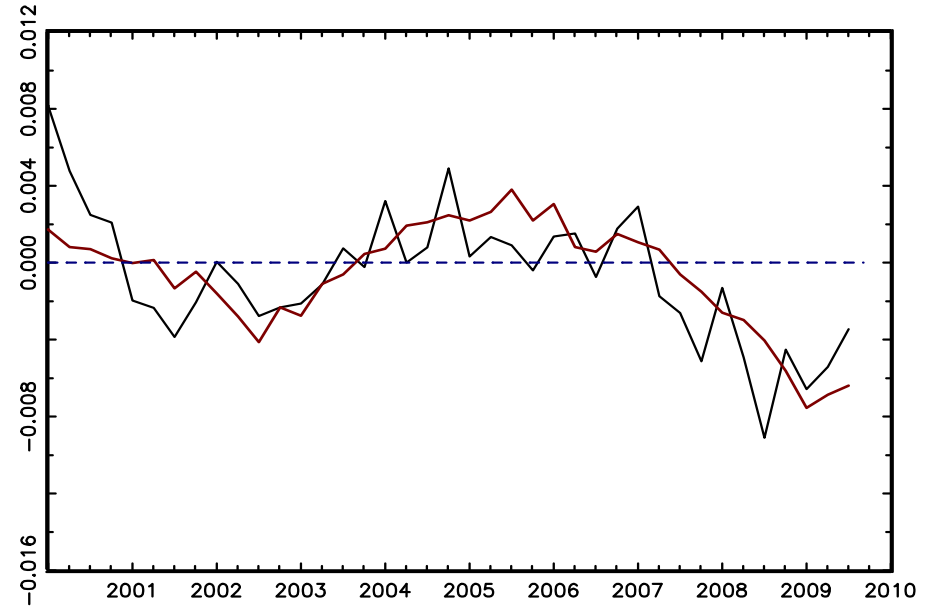
Year-Over-Year



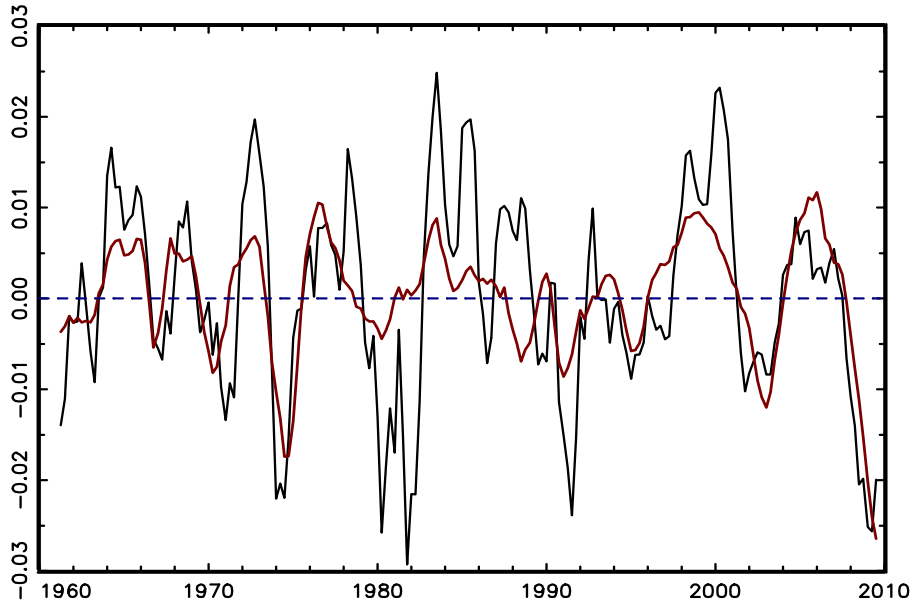
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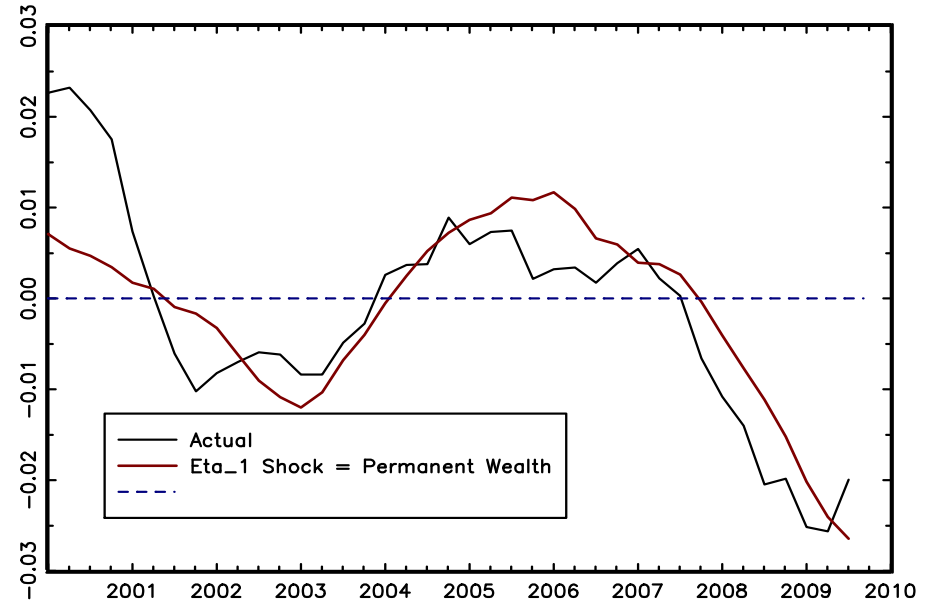
Cons:Svc



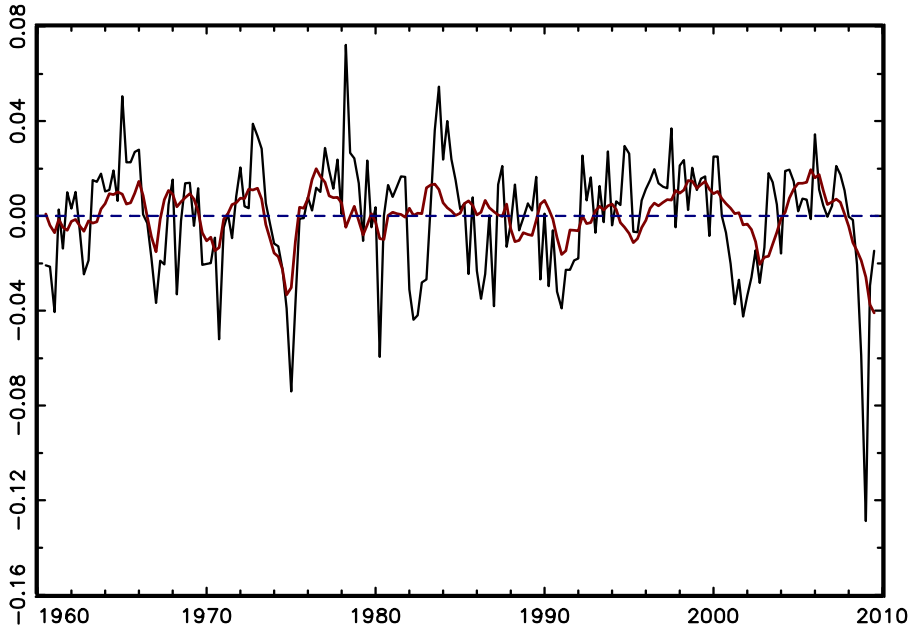
Year-Over-Year



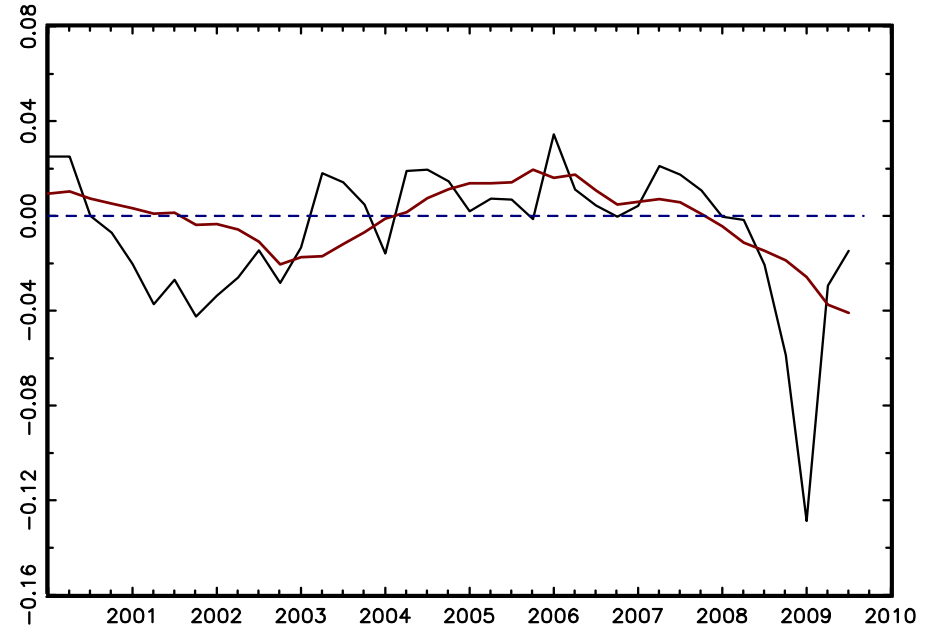
Year-Over-Year



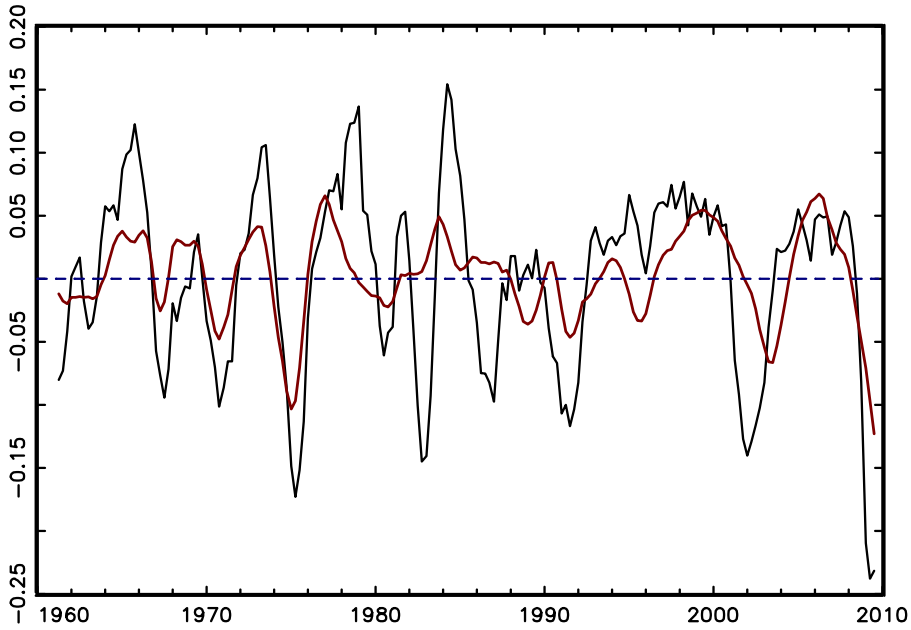
FixInv:NonRes



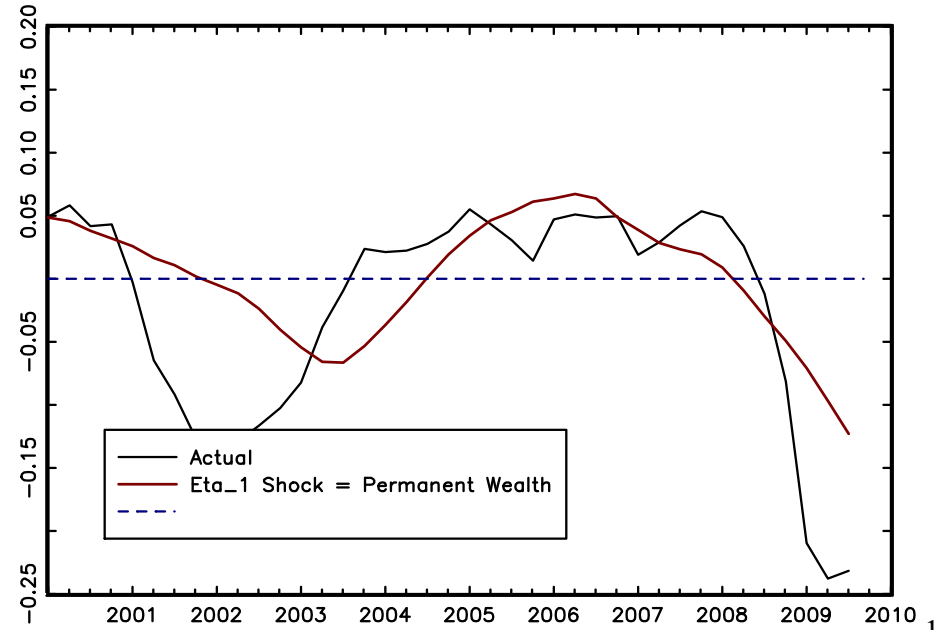
FixInv:NonRes



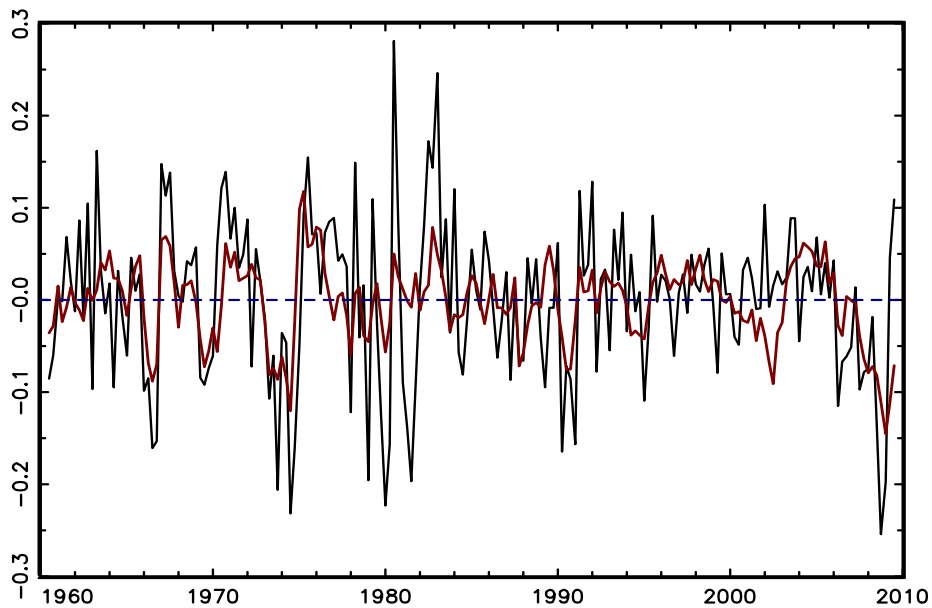
Year-Over-Year



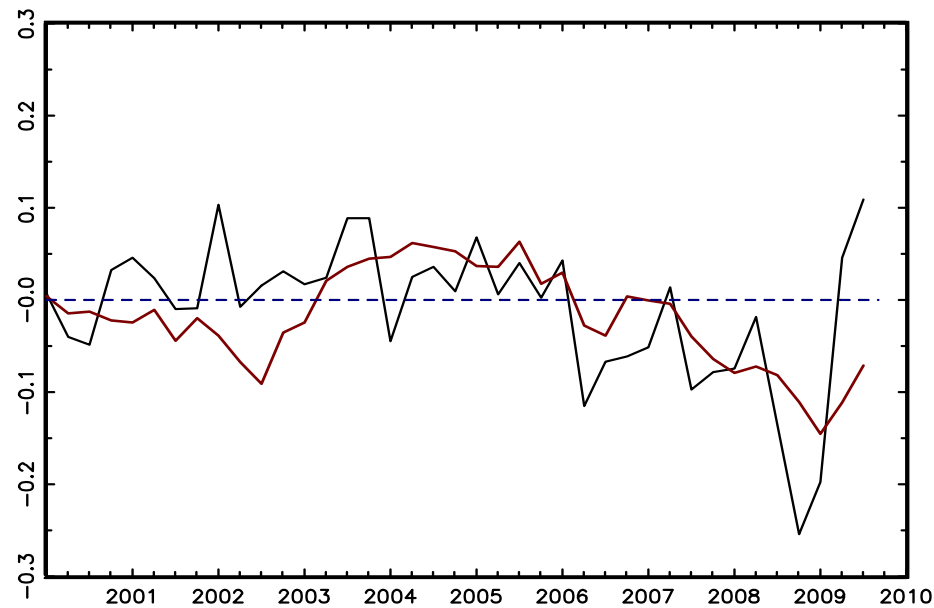
Year-Over-Year



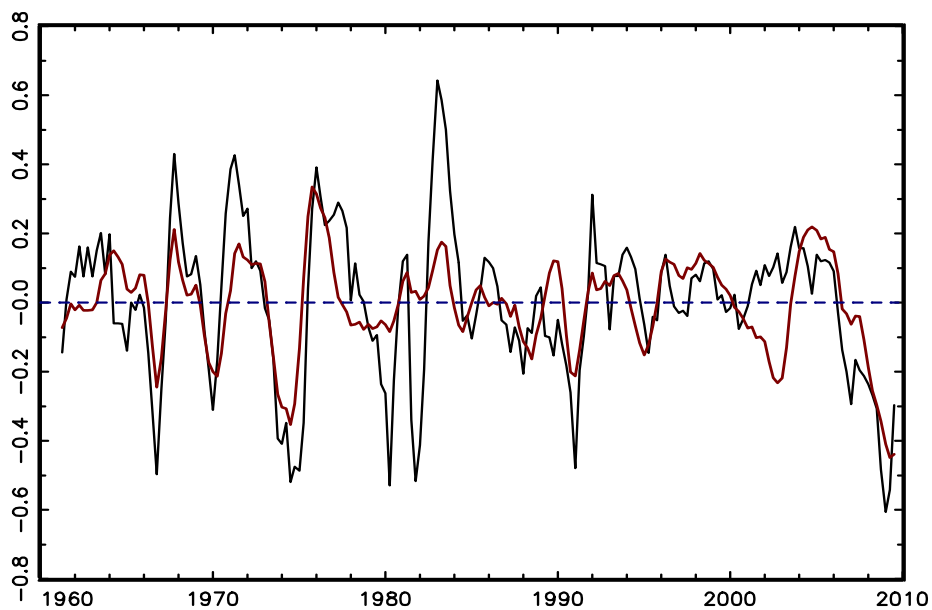
Hstarts



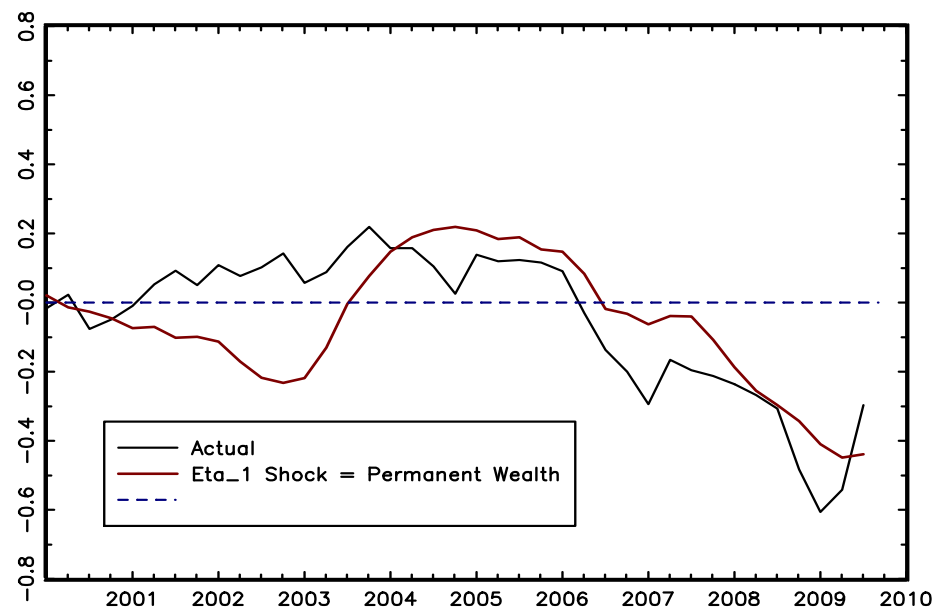
Hstarts



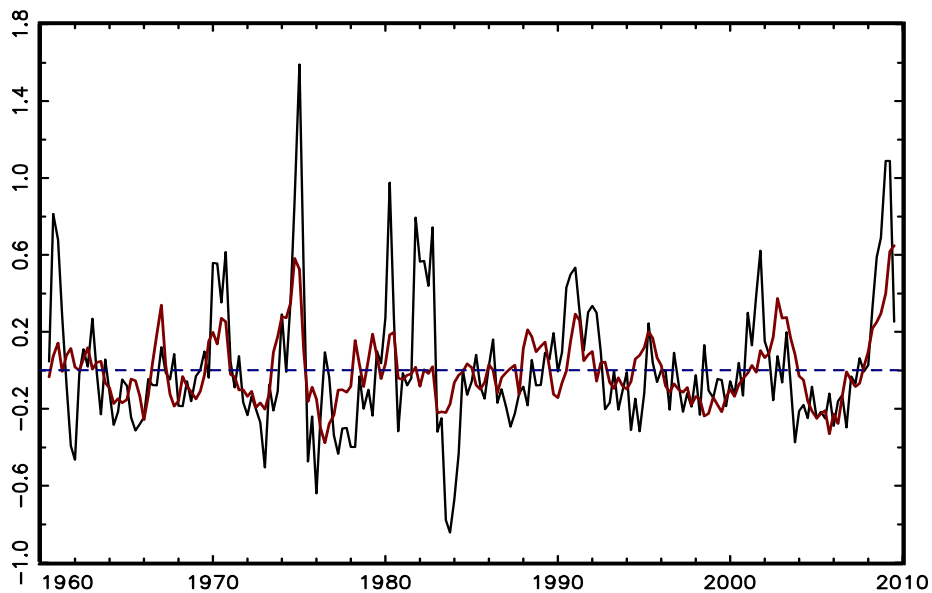
Year-Over-Year



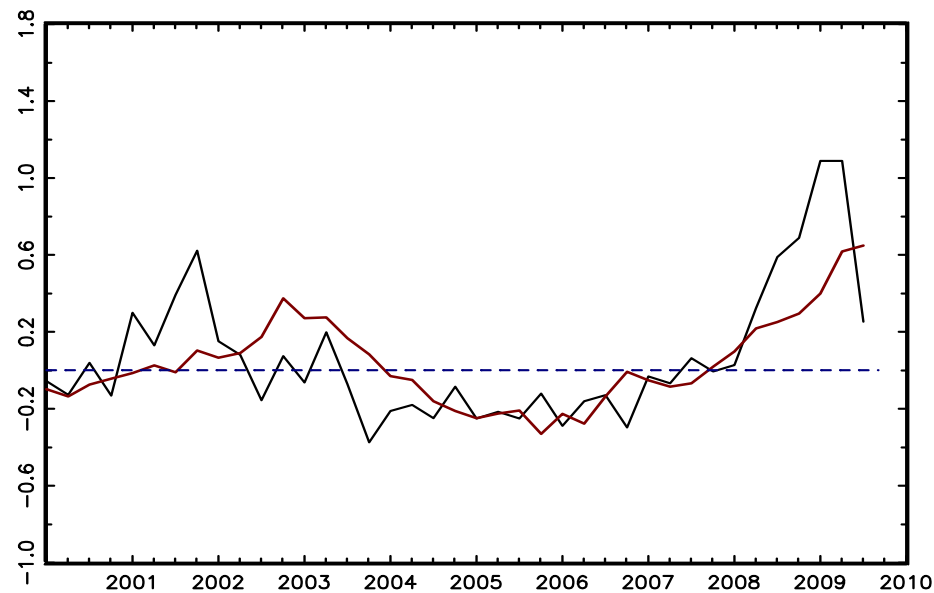
Year-Over-Year



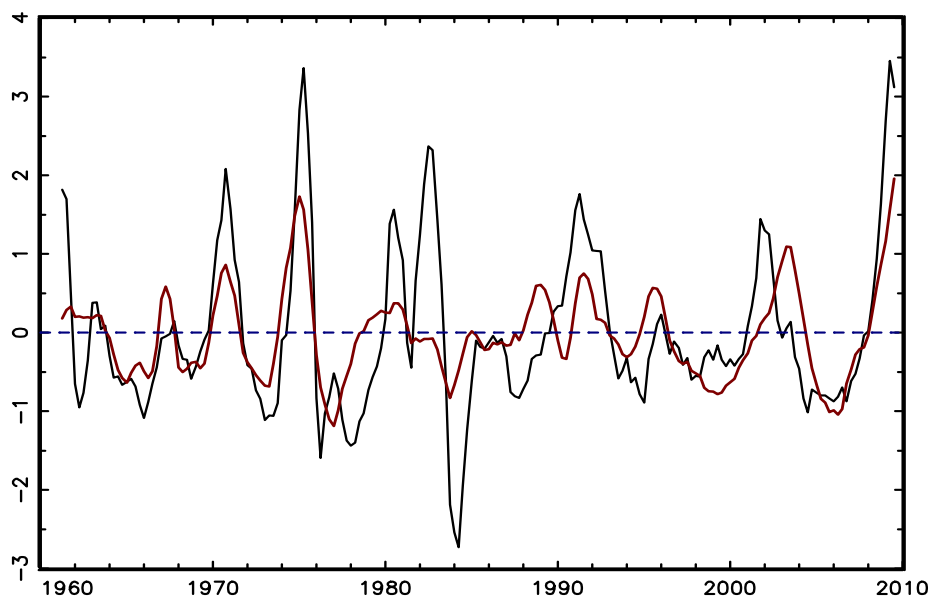
Unemp Rate



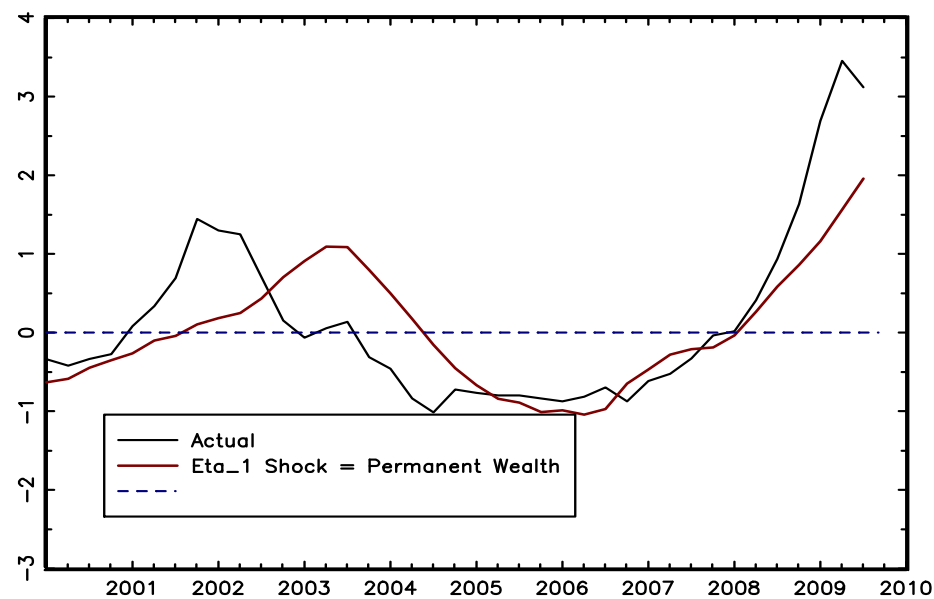
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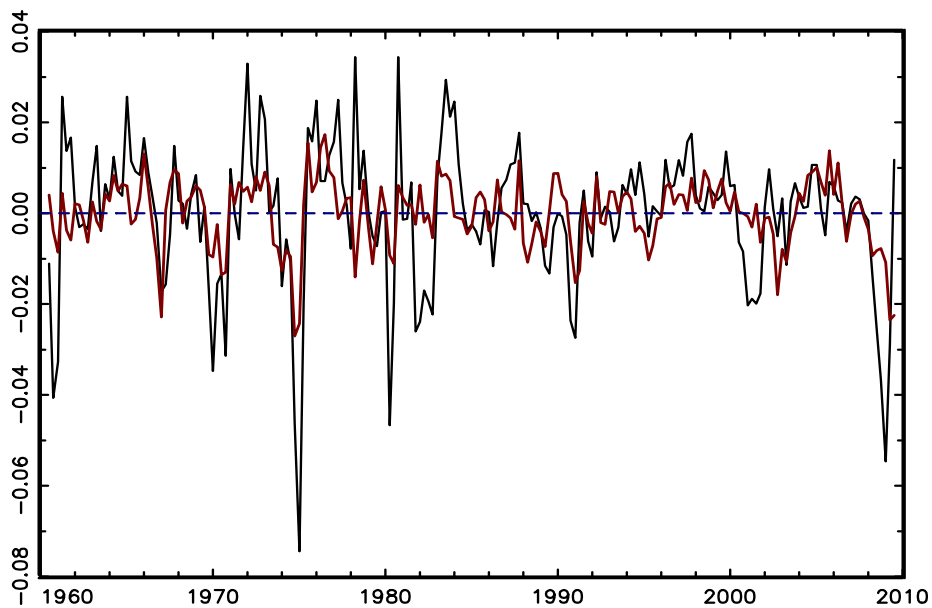
Year-Over-Year



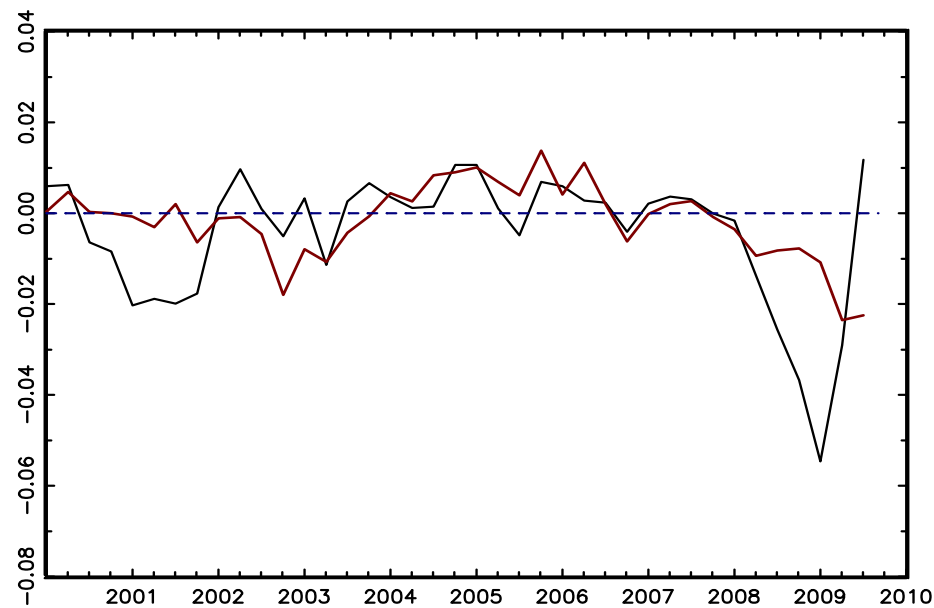
Year-Over-Year



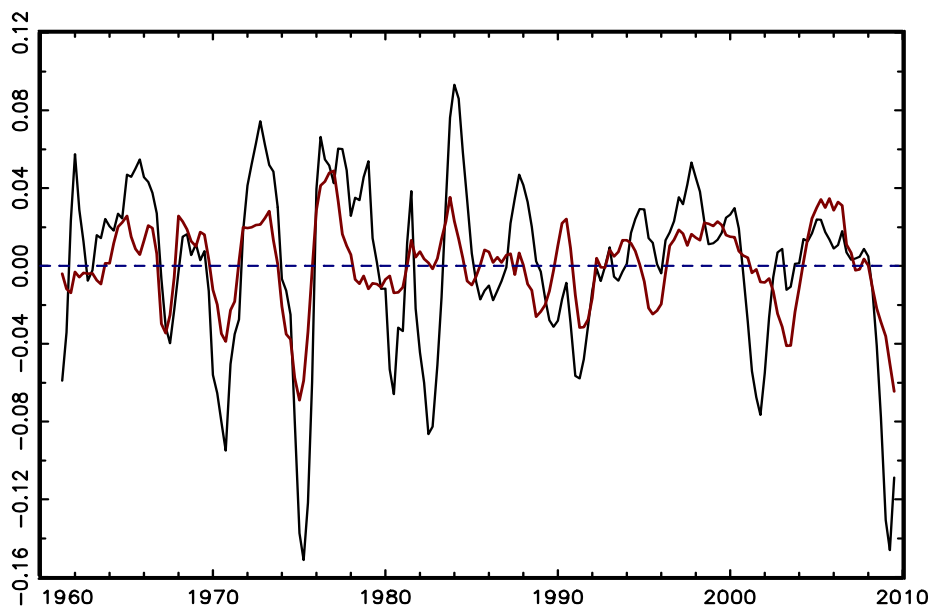
IP: Total index



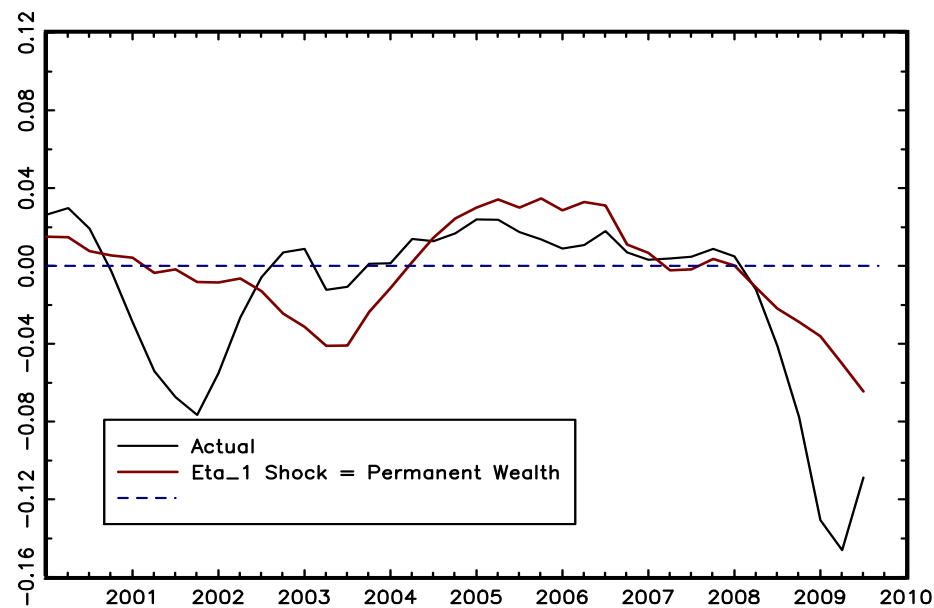
IP: Total index



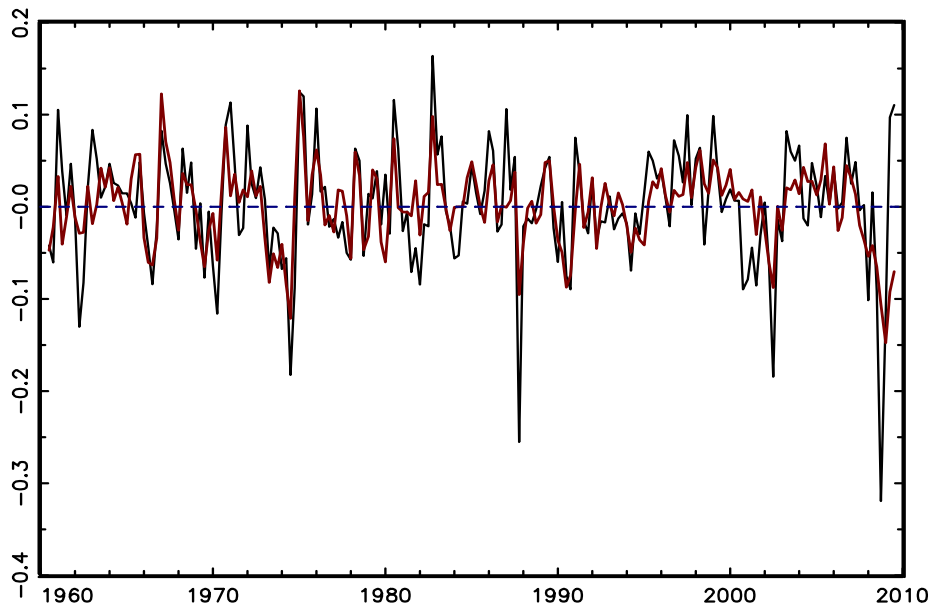
Year-Over-Year



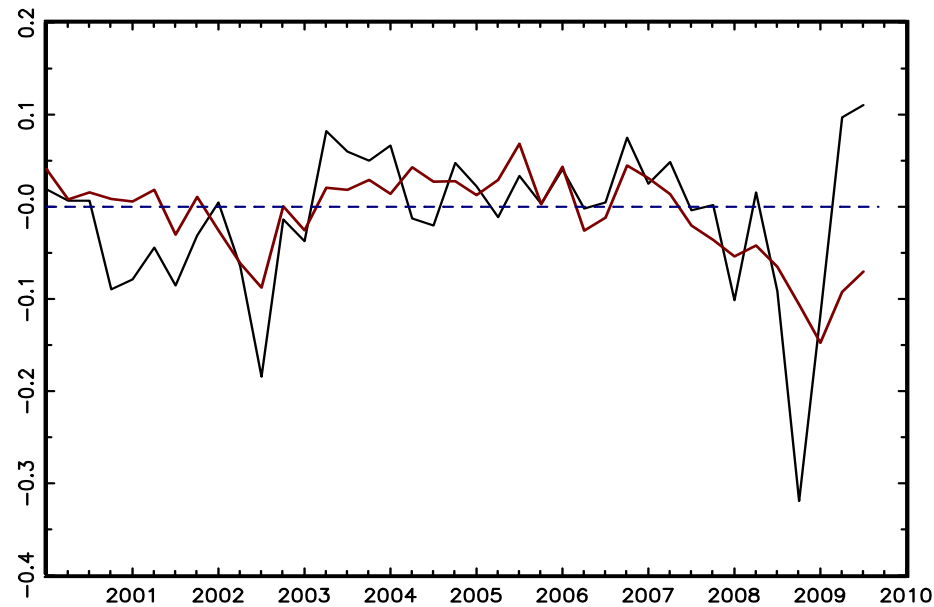
Year-Over-Year



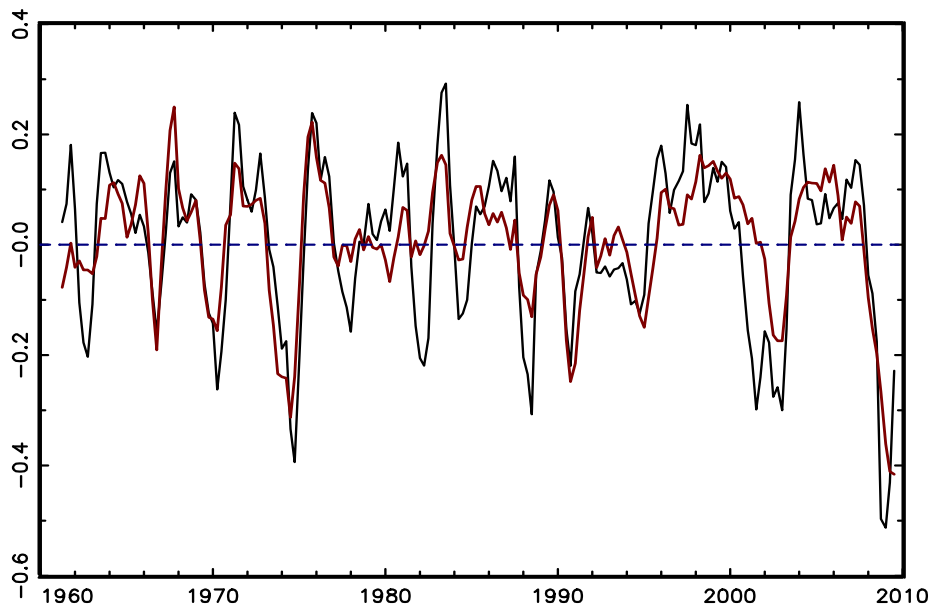
S&P 500



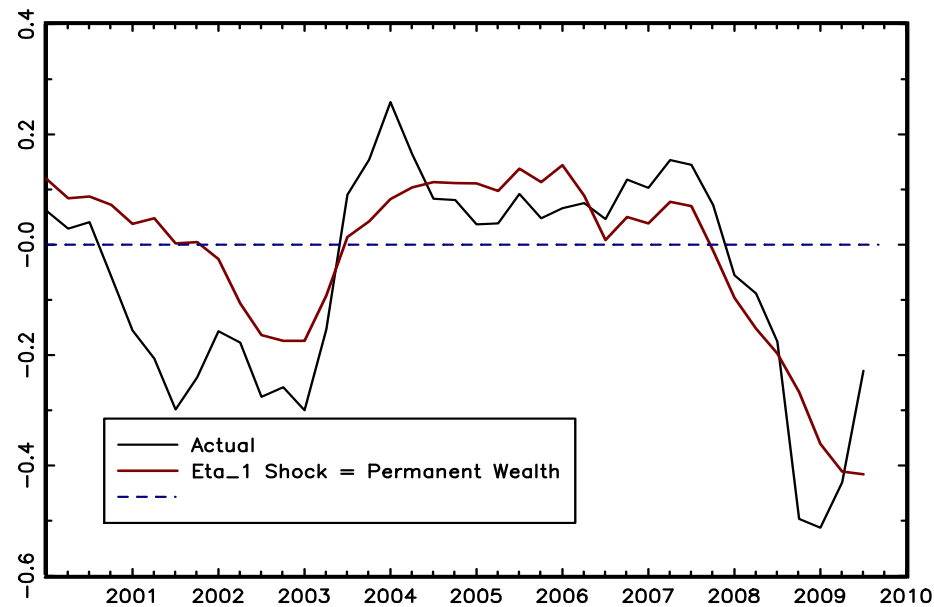
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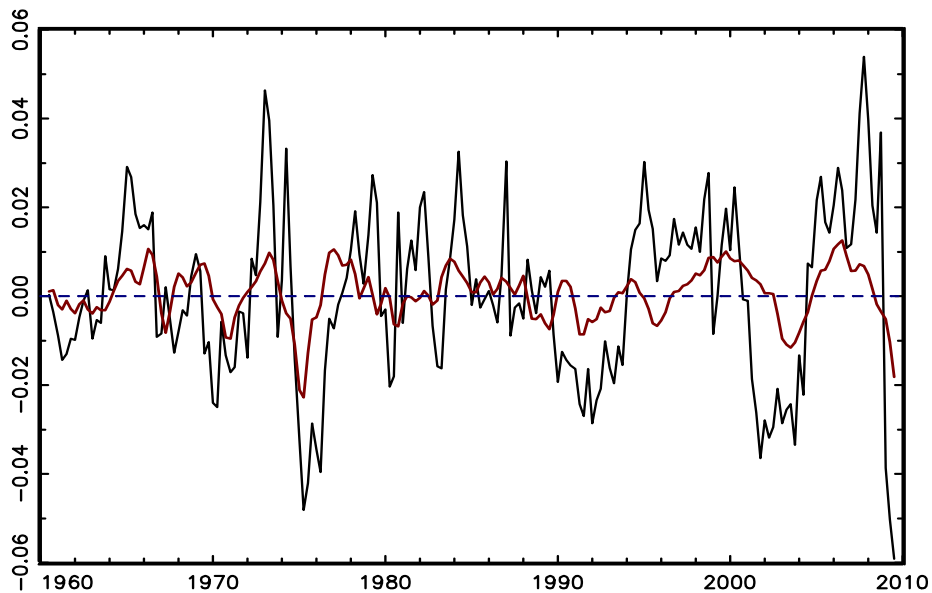
Year-Over-Year



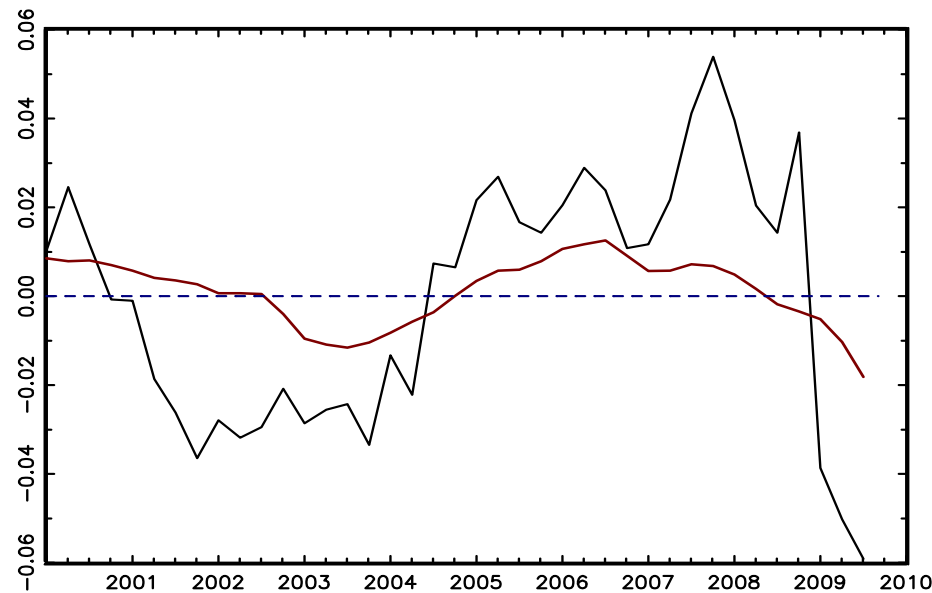
Year-Over-Year



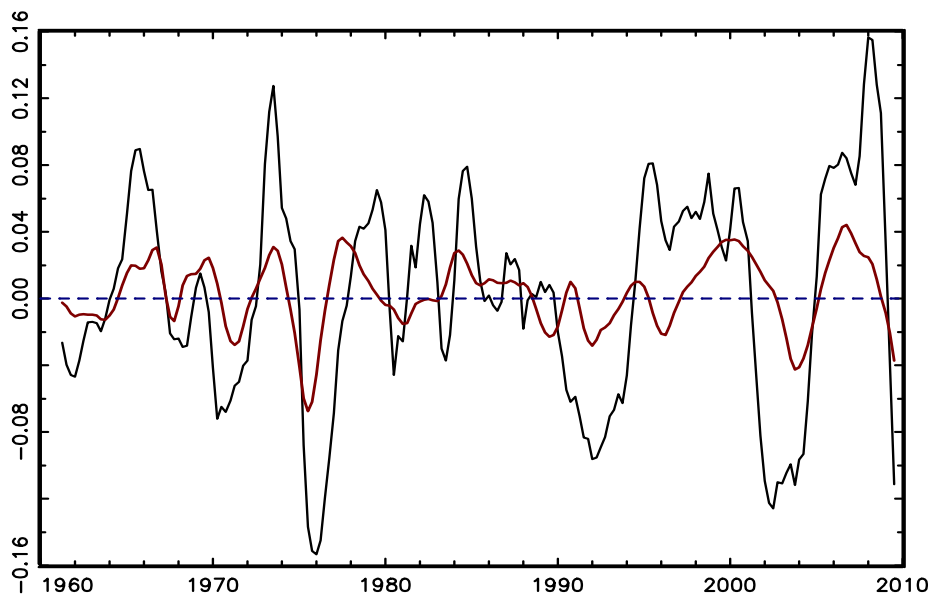
Real C&Lload



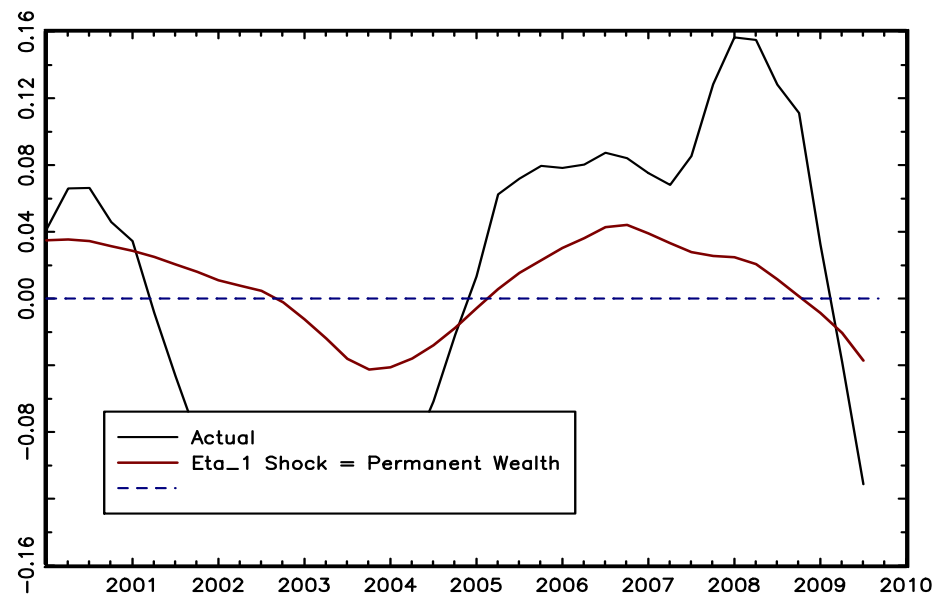
Real C&Lload



Year-Over-Year



Year-Over-Year

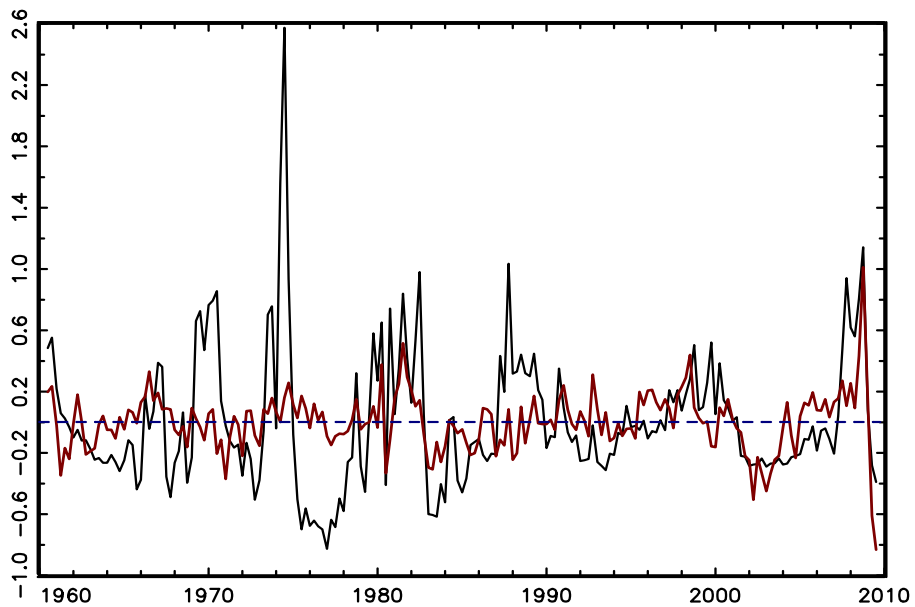


Credit Spreads:

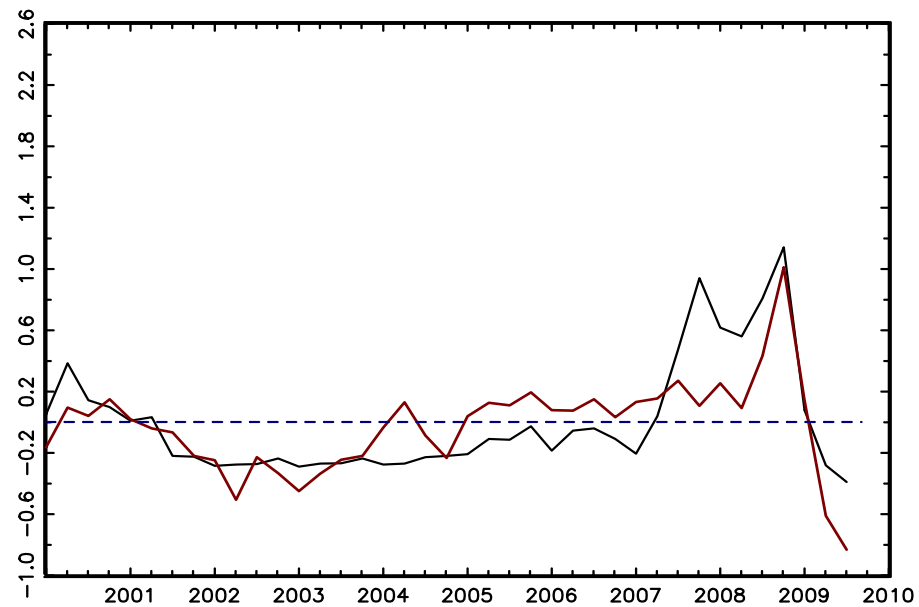
$$Z_t = \begin{pmatrix} \lambda'_{\text{ComPaper-Tbill}} \\ \lambda'_{\text{TedSpread}} \end{pmatrix} \varepsilon_t$$

$$W_t = 0$$

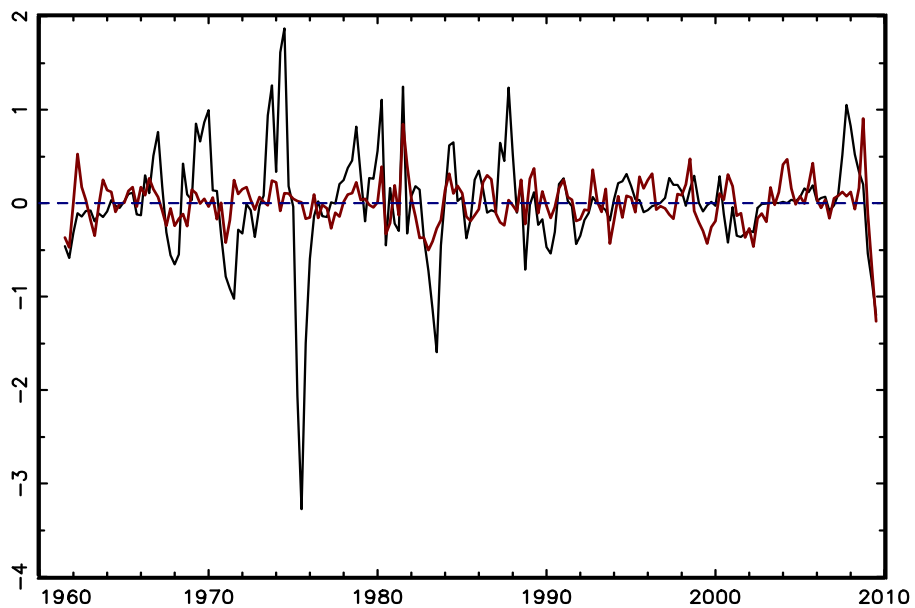
CP_Tbill Spread



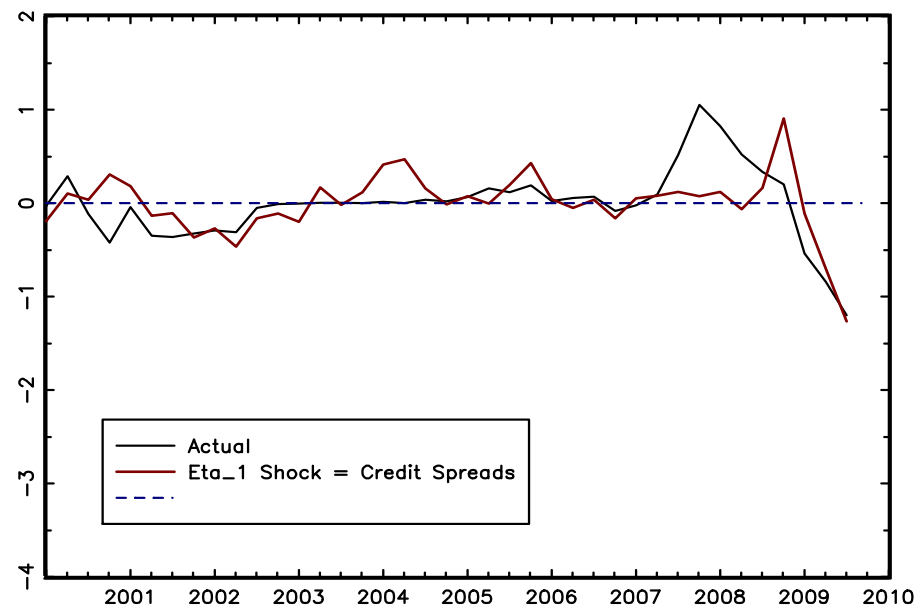
CP_Tbill Spread

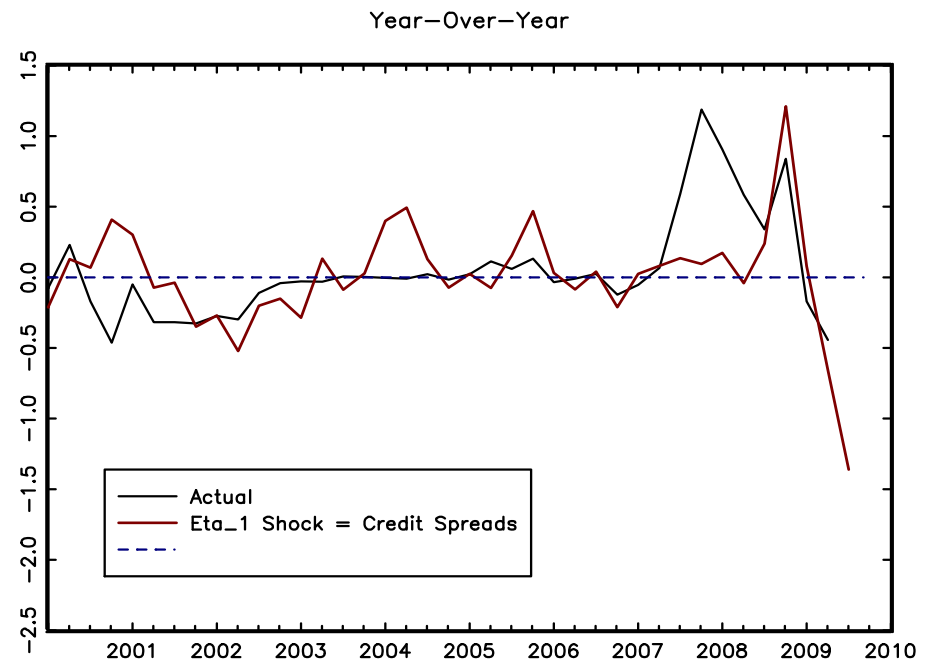
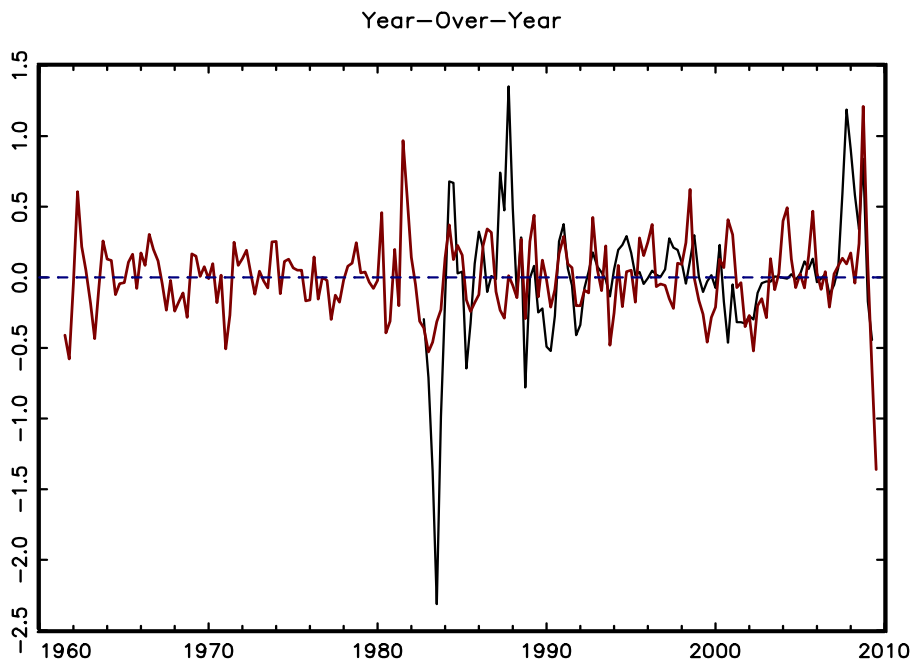
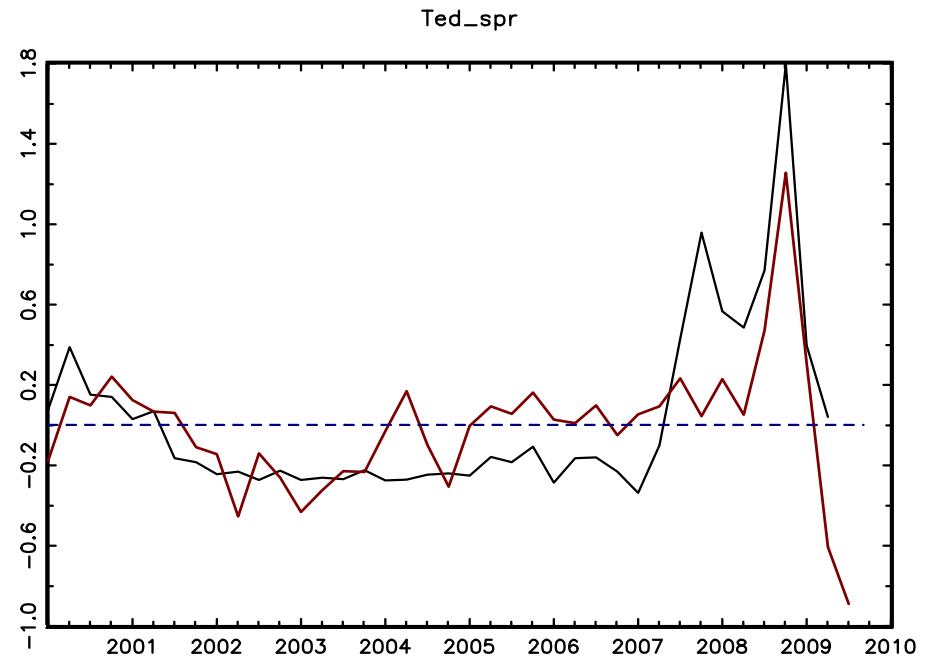
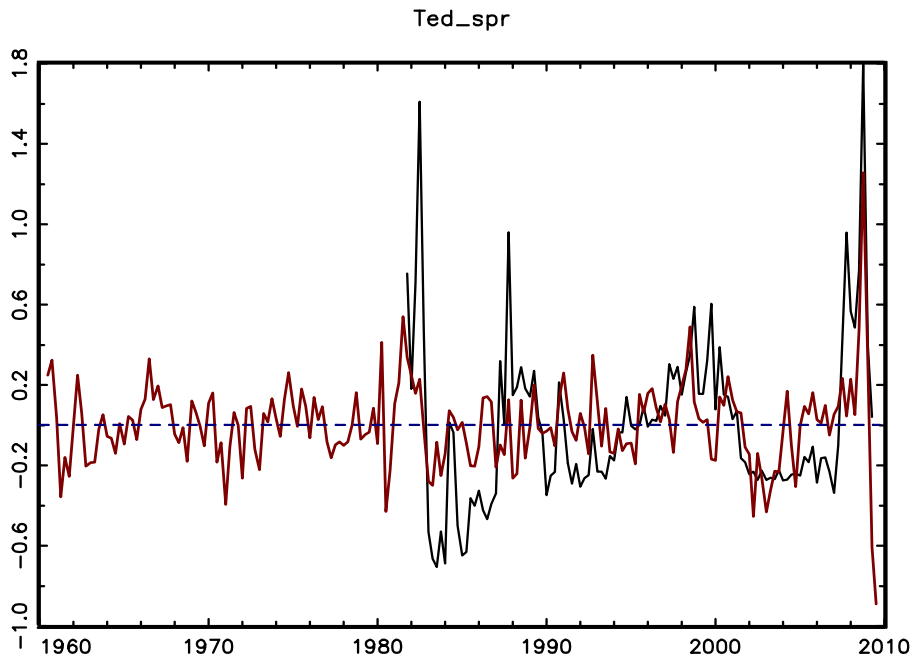


Year-Over-Year

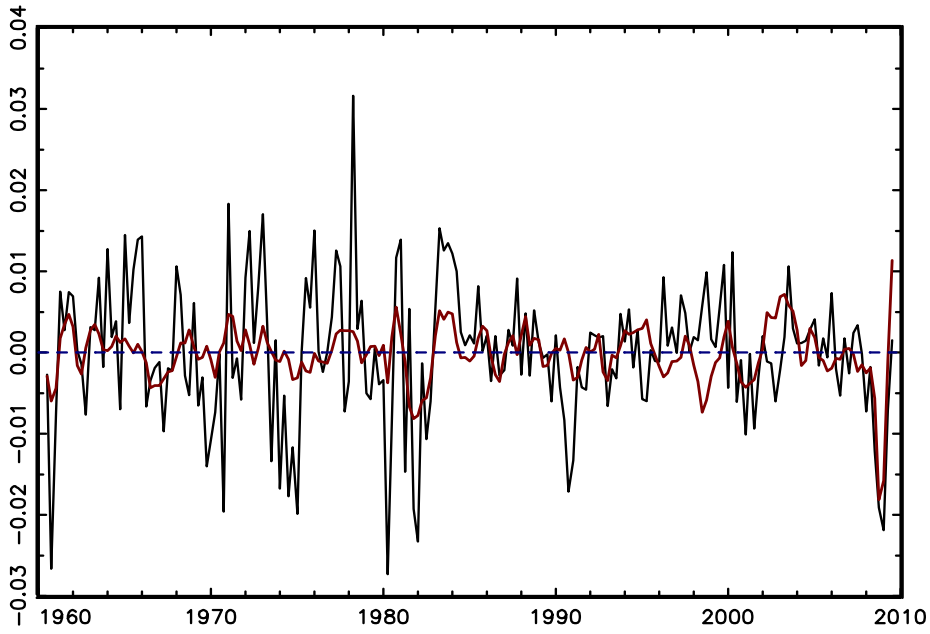


Year-Over-Year

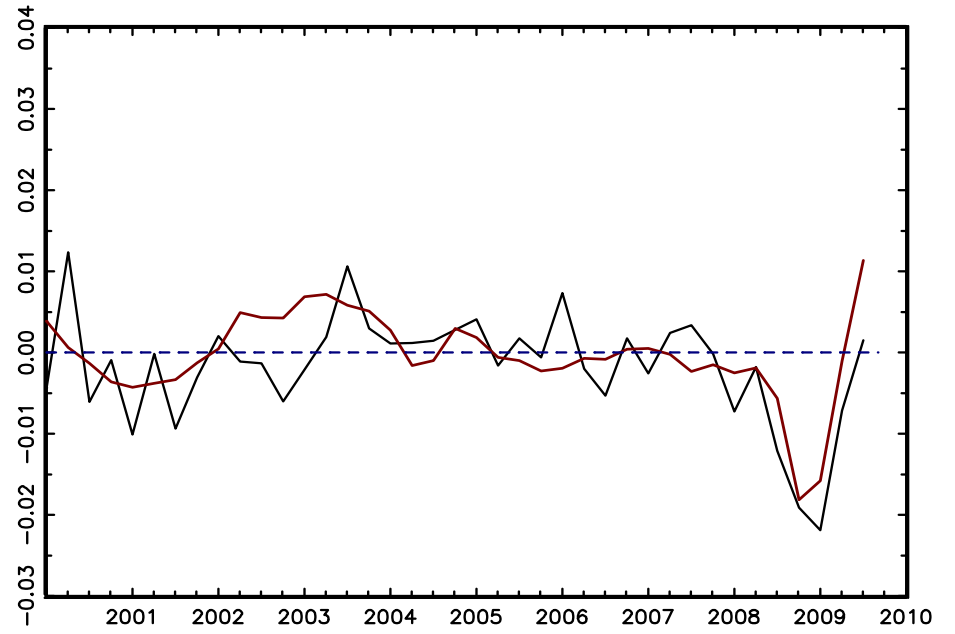




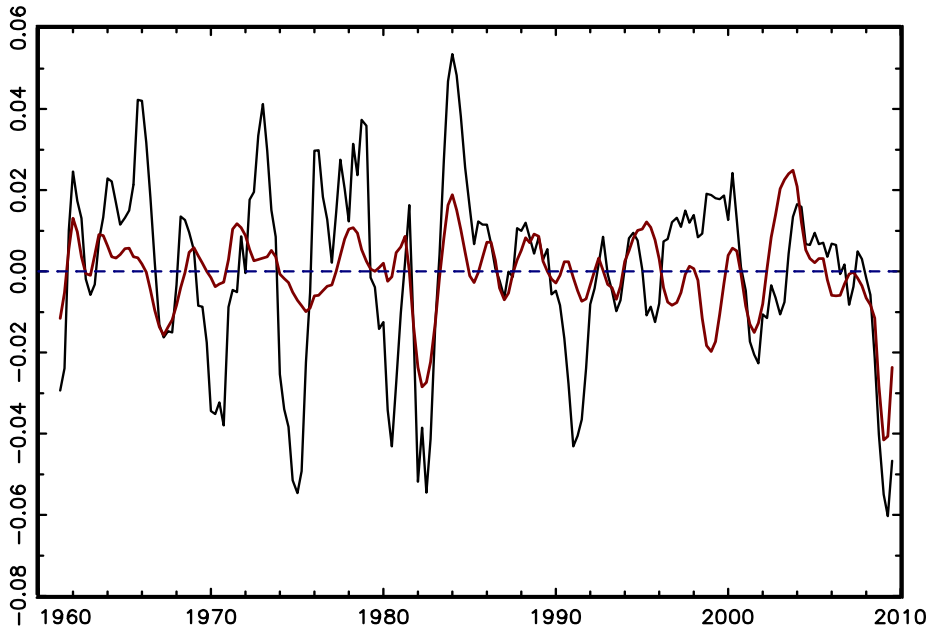
GDP



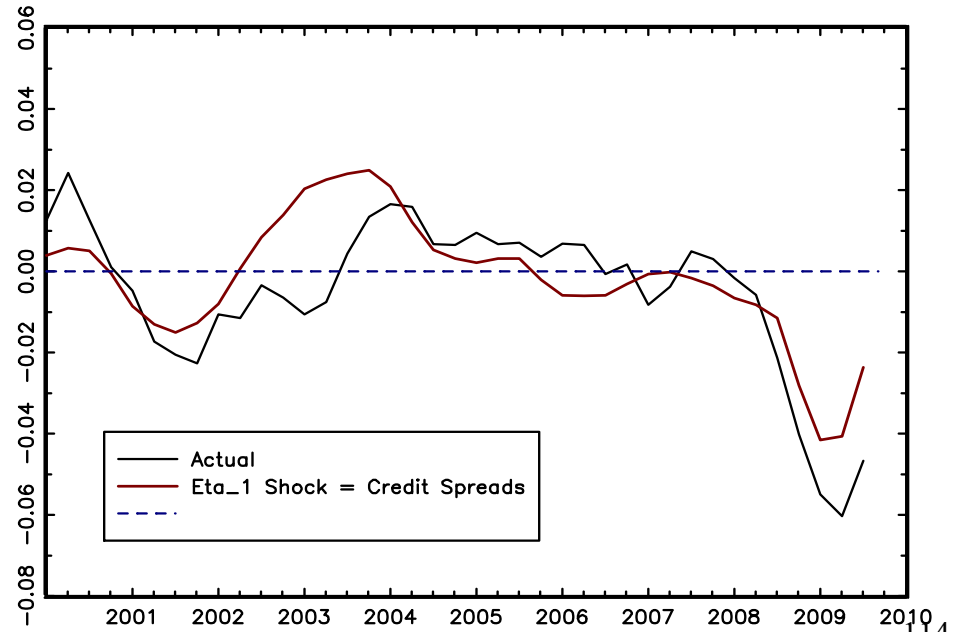
GDP



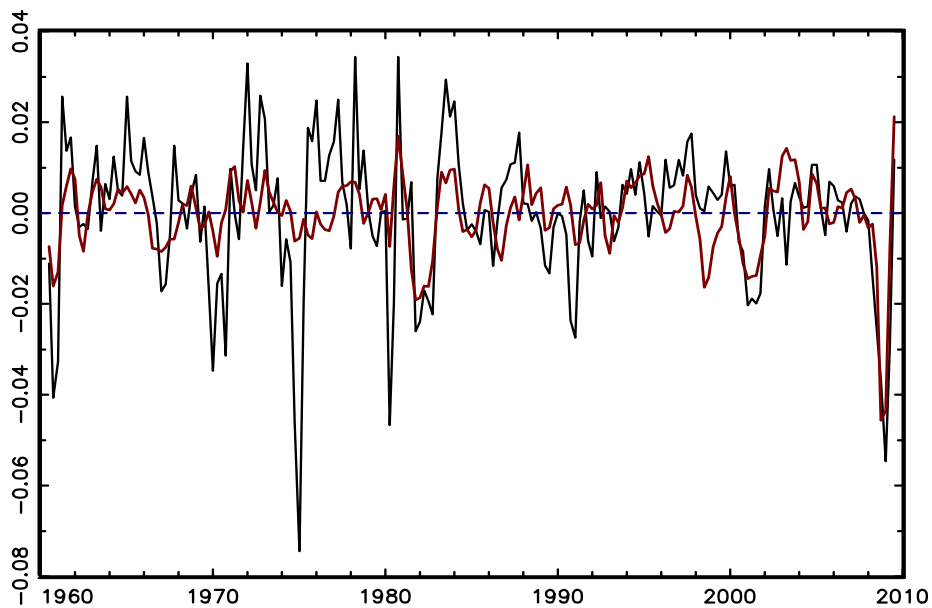
Year-Over-Year



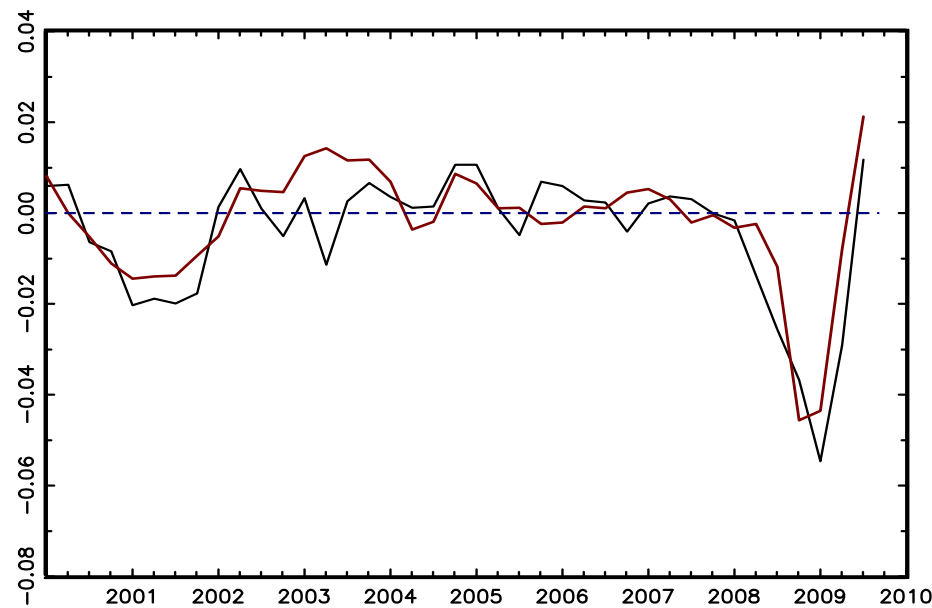
Year-Over-Year



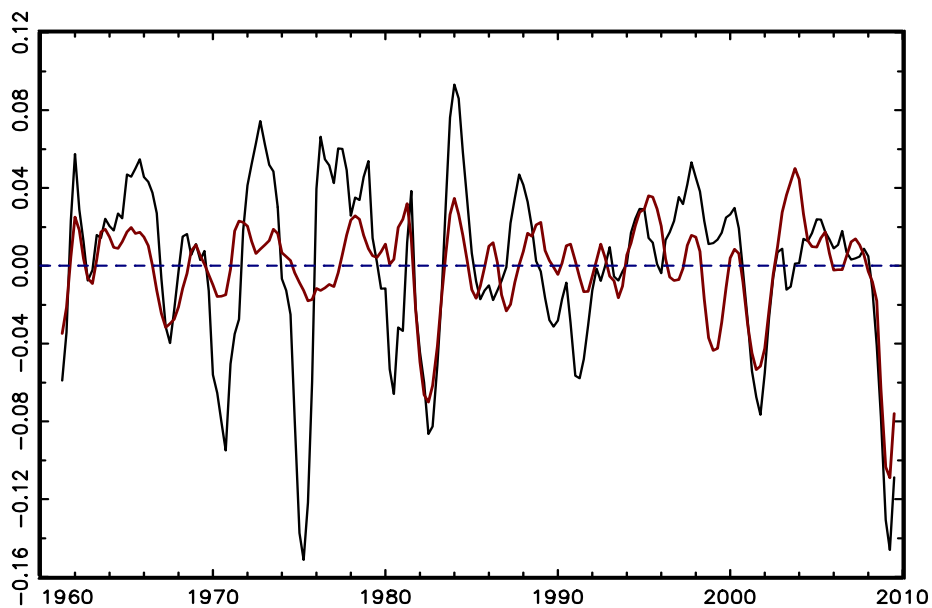
IP: Total index



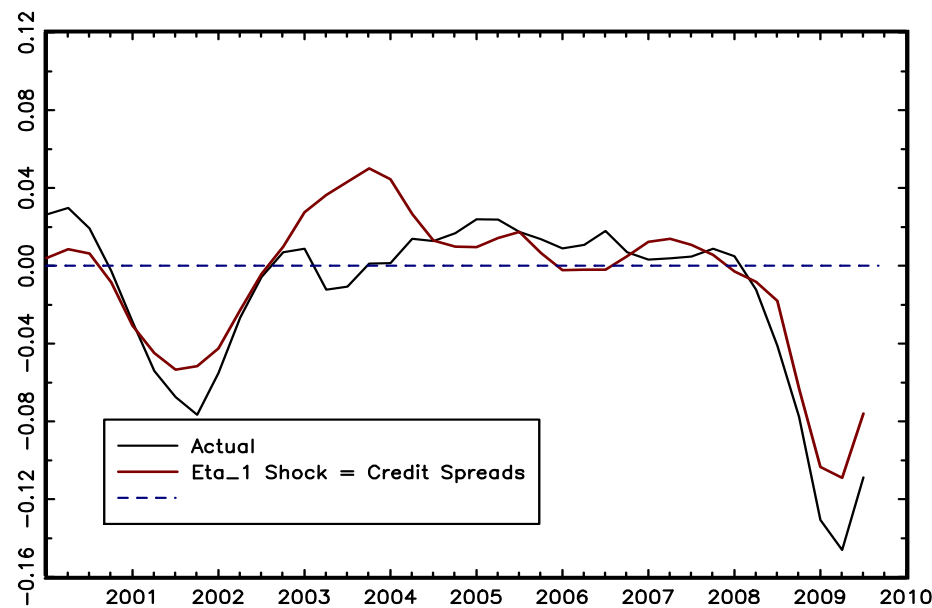
IP: Total index



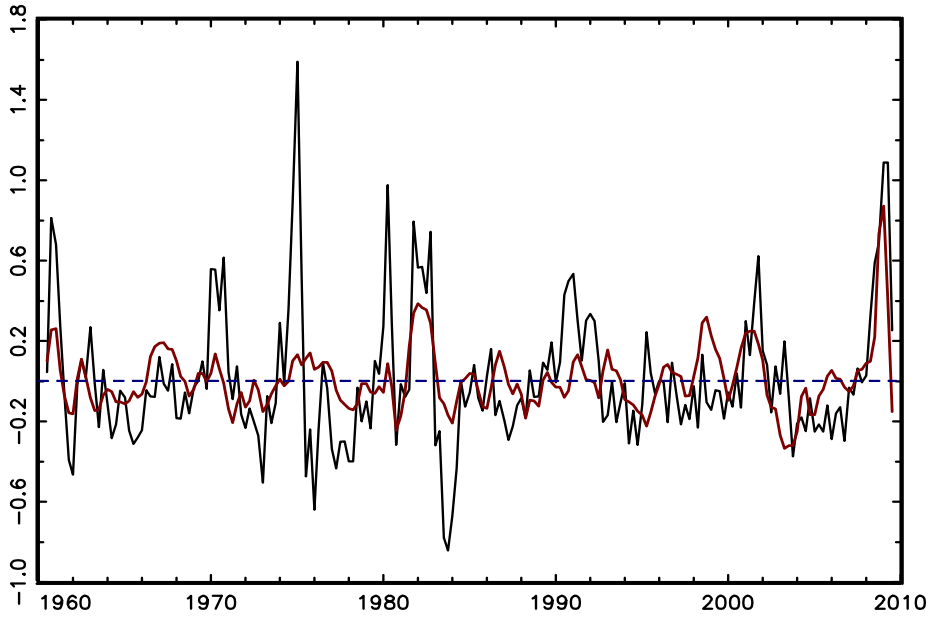
Year-Over-Year



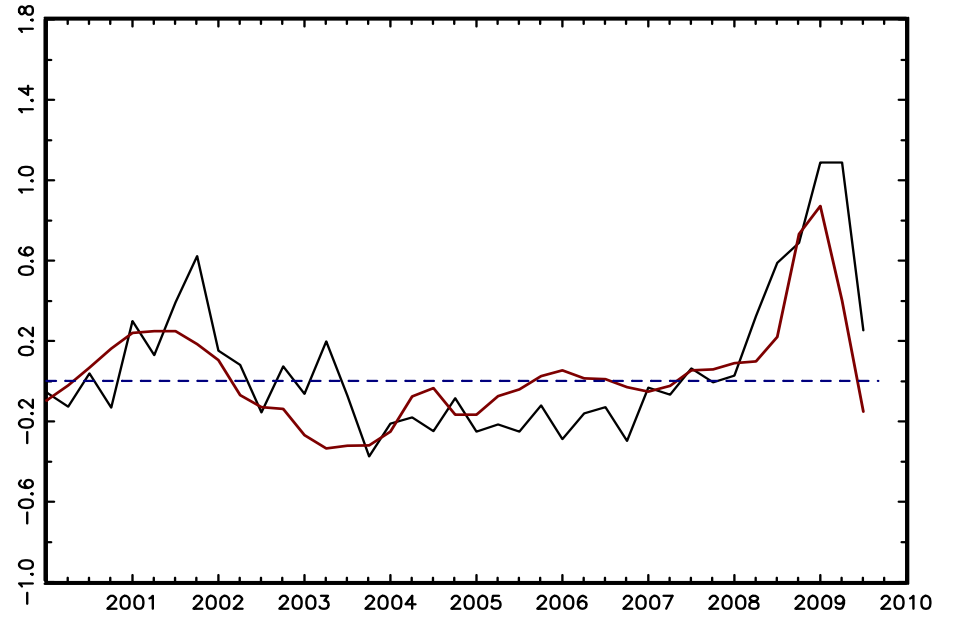
Year-Over-Year



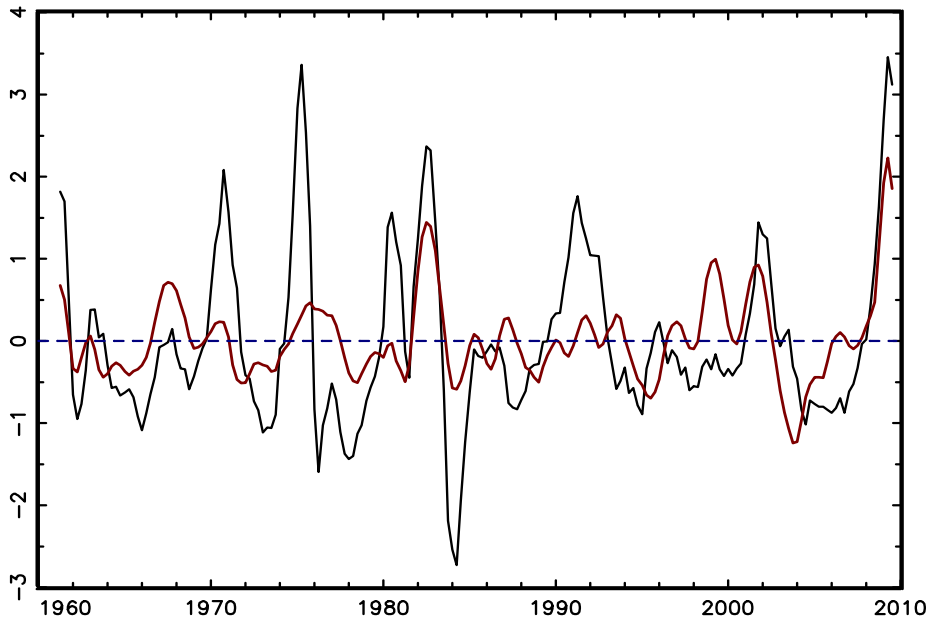
Unemp Rate



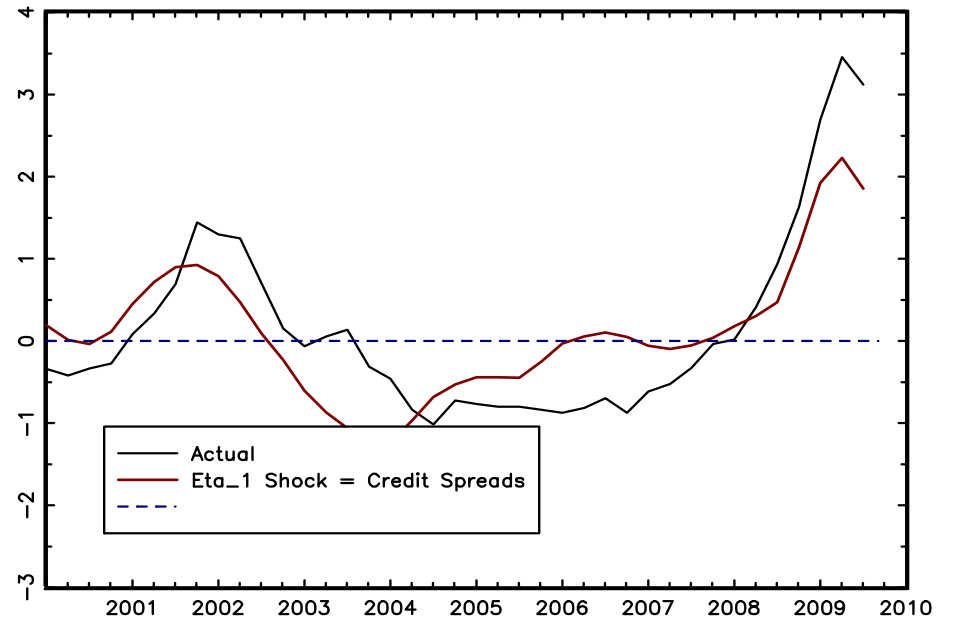
Unemp Rate



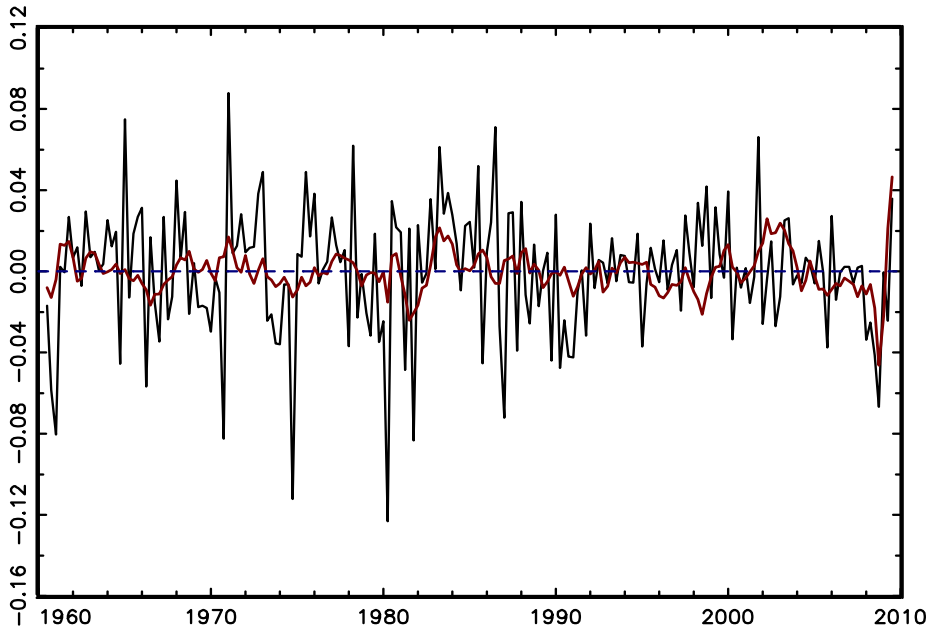
Year-Over-Year



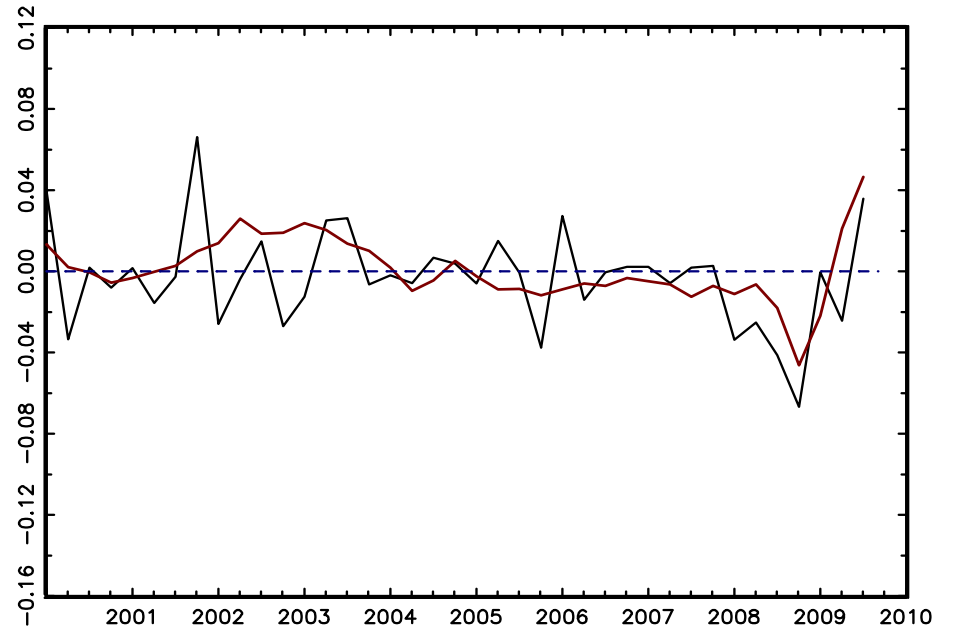
Year-Over-Year



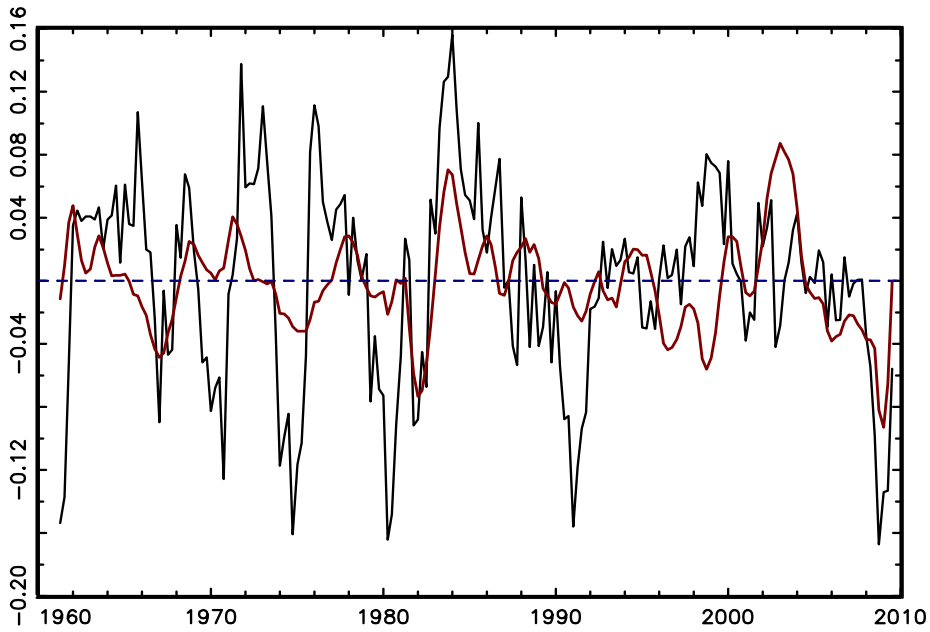
Cons:Dur



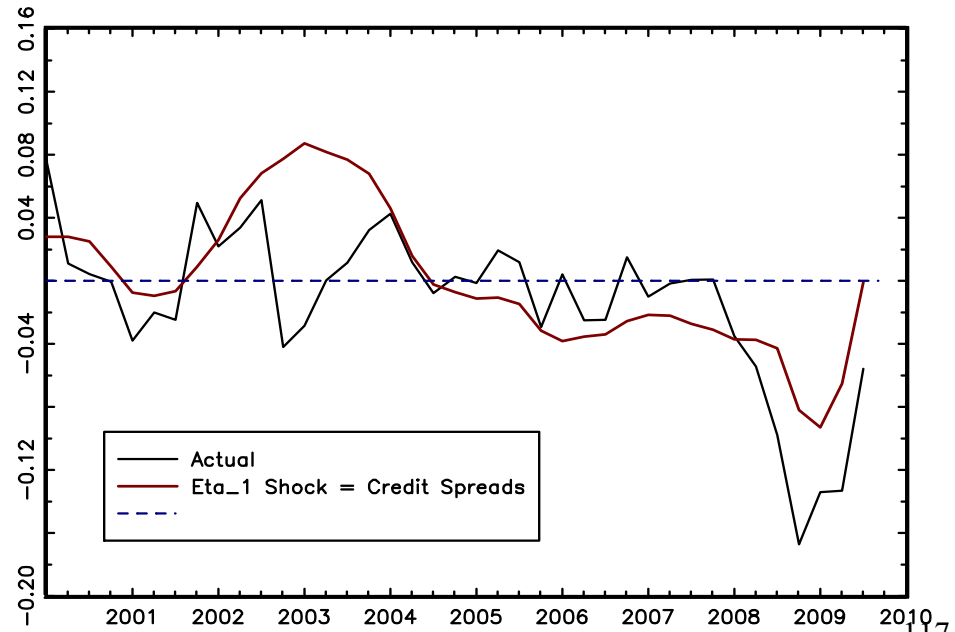
Cons:Dur



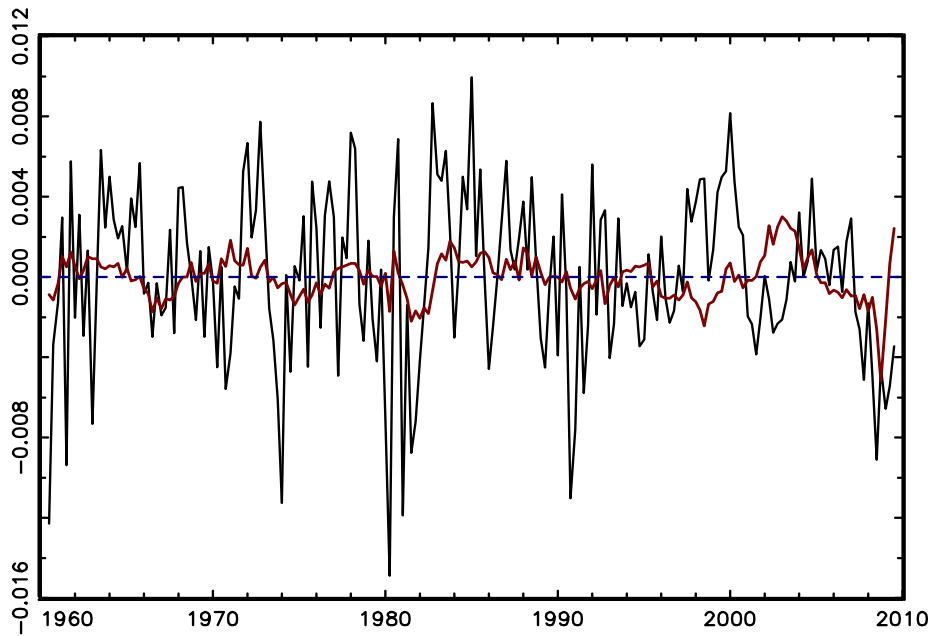
Year-Over-Year



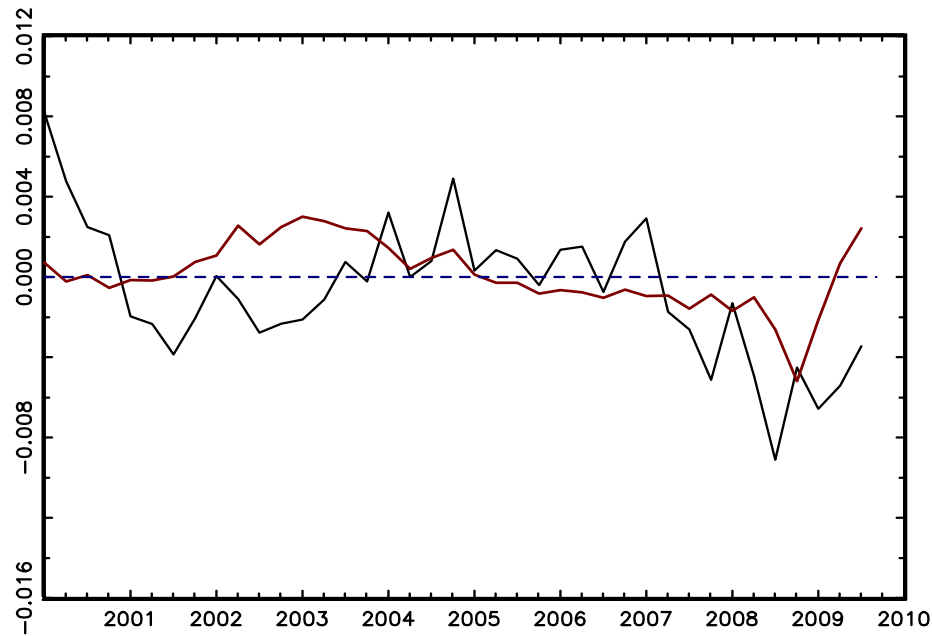
Year-Over-Year



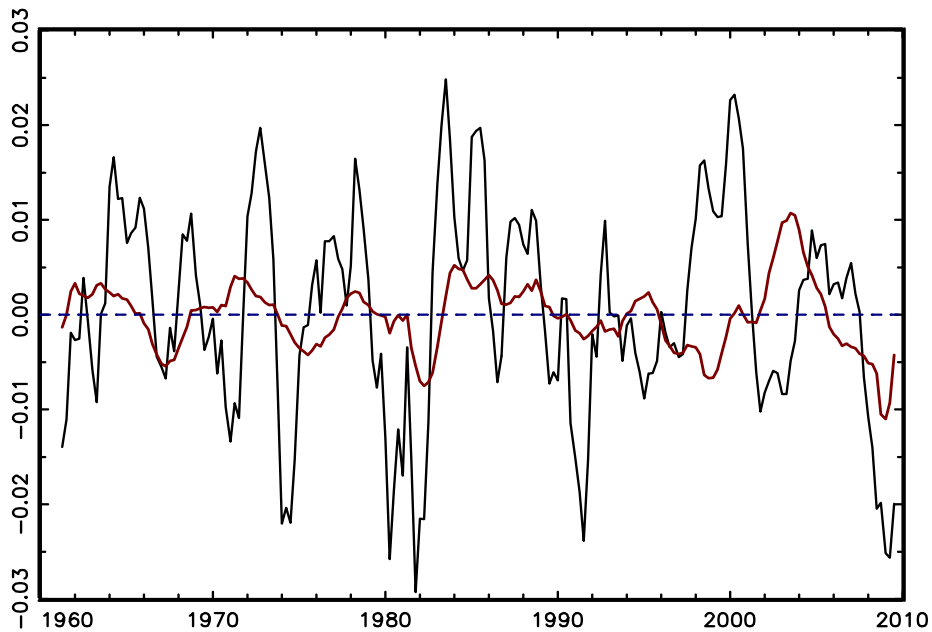
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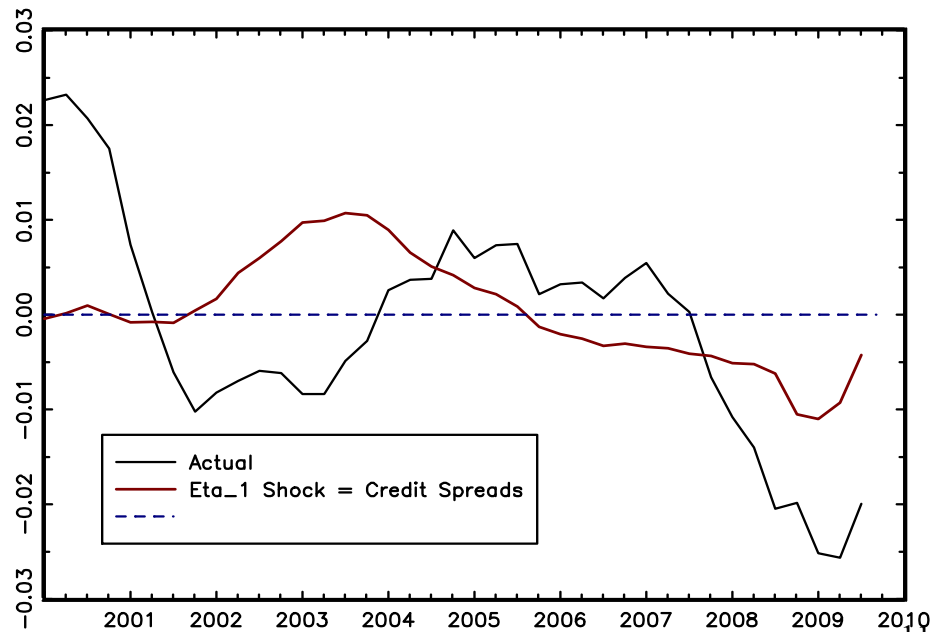
Cons:Svc



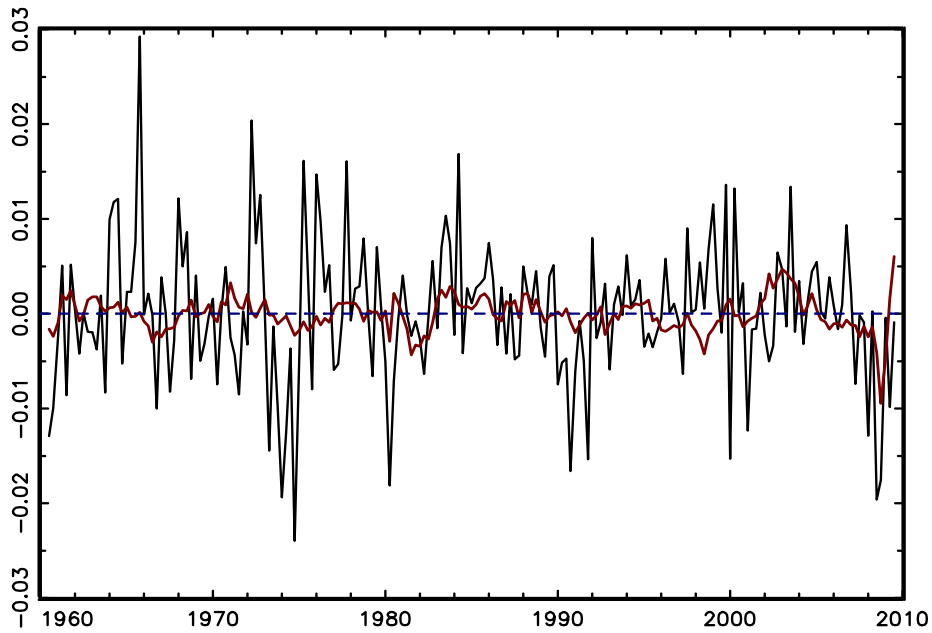
Year-Over-Year



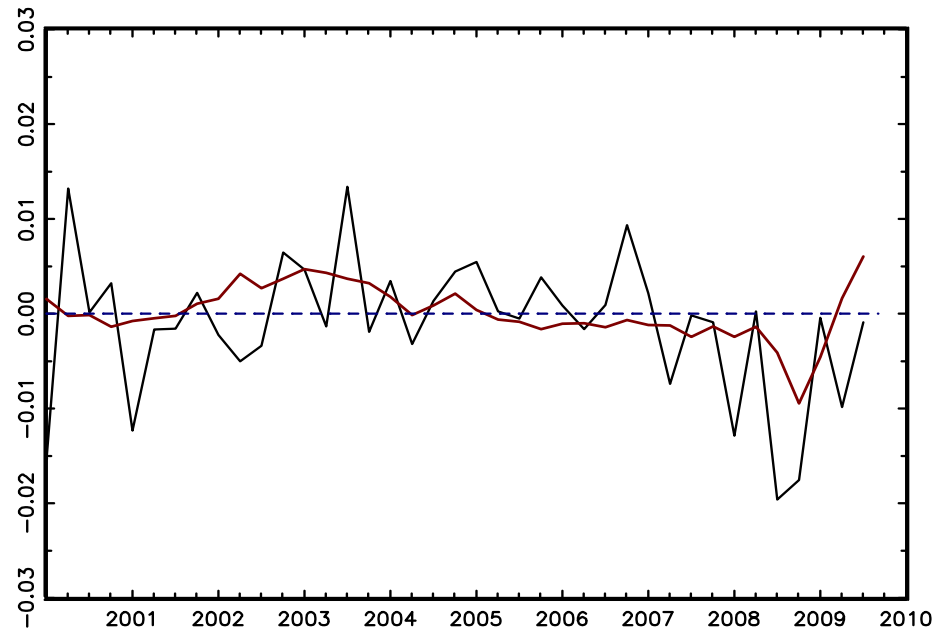
Year-Over-Year



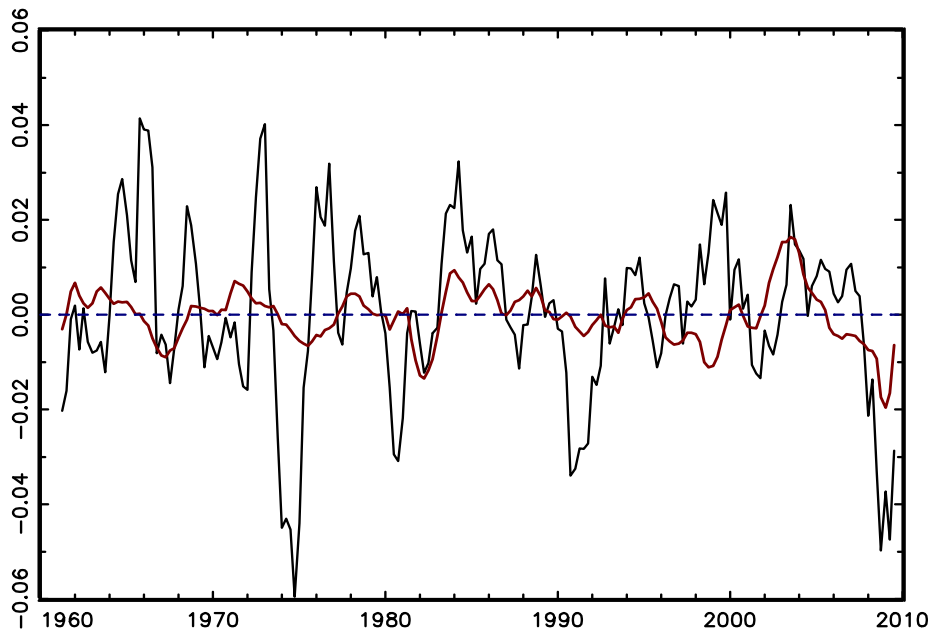
Cons:NonDur



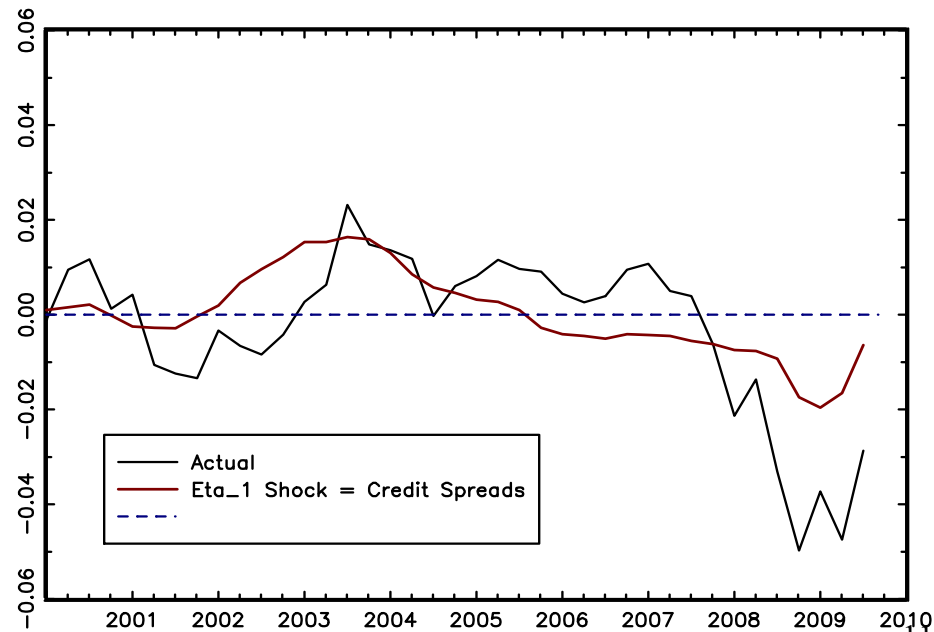
Cons:NonDur



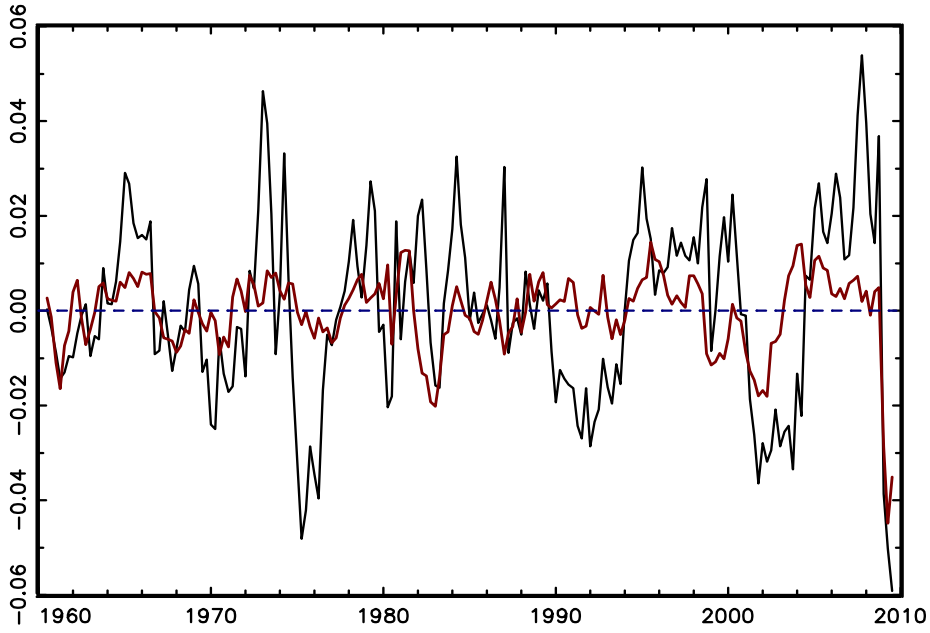
Year-Over-Year



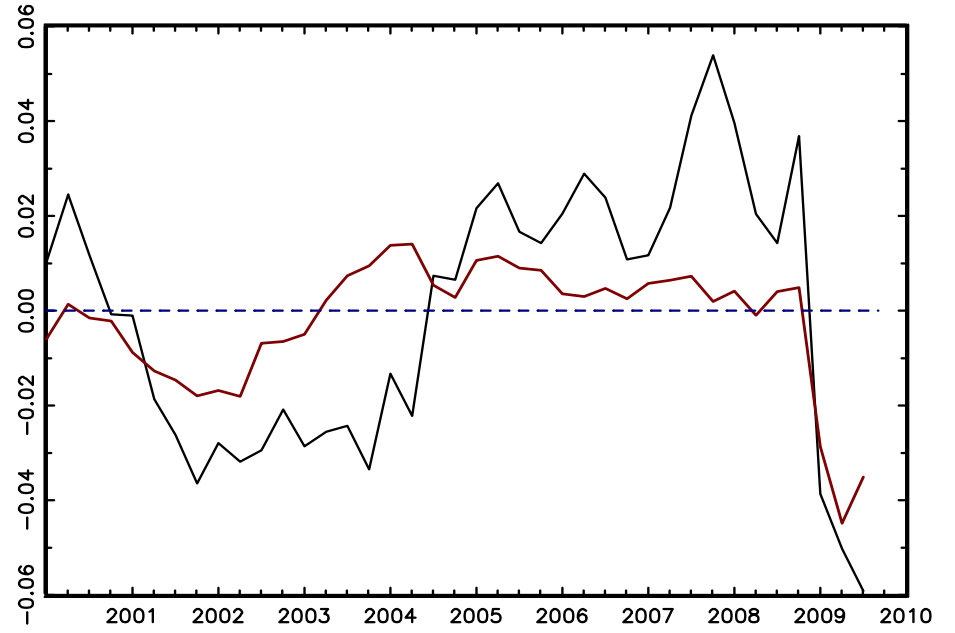
Year-Over-Year



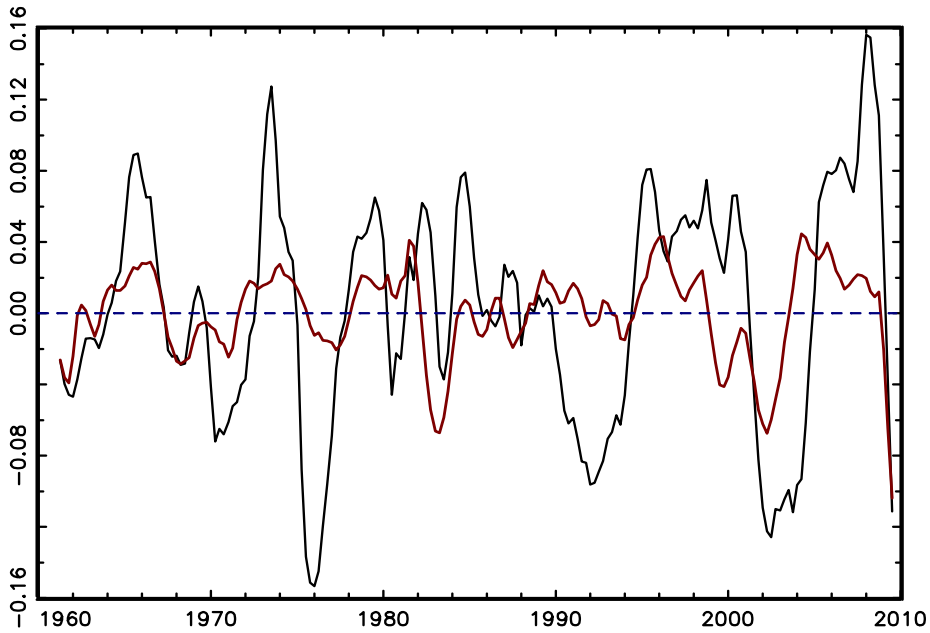
Real C&Lload



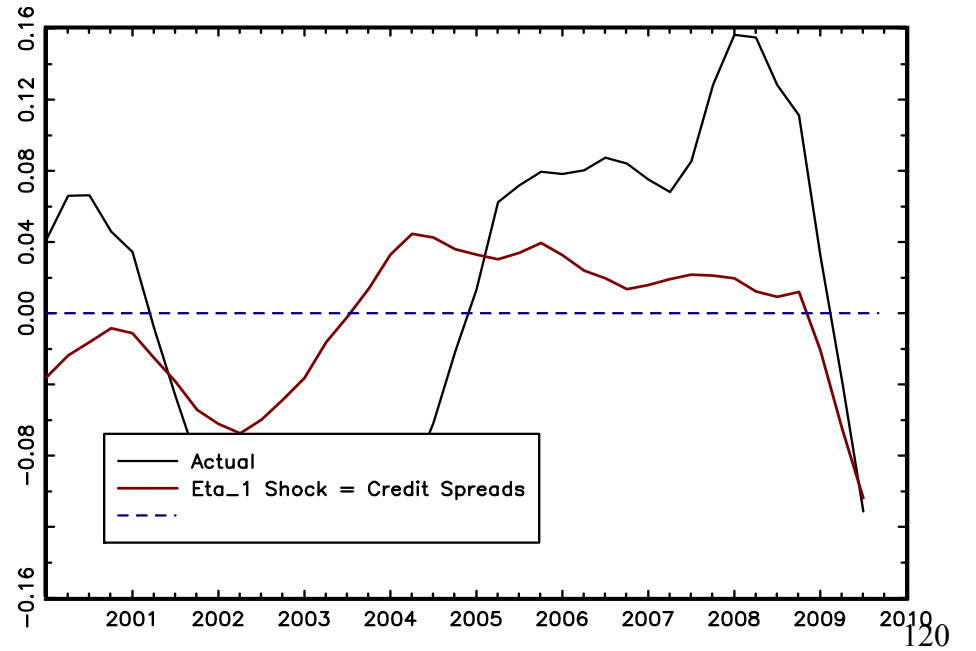
Real C&Lload



Year-Over-Year



Year-Over-Year

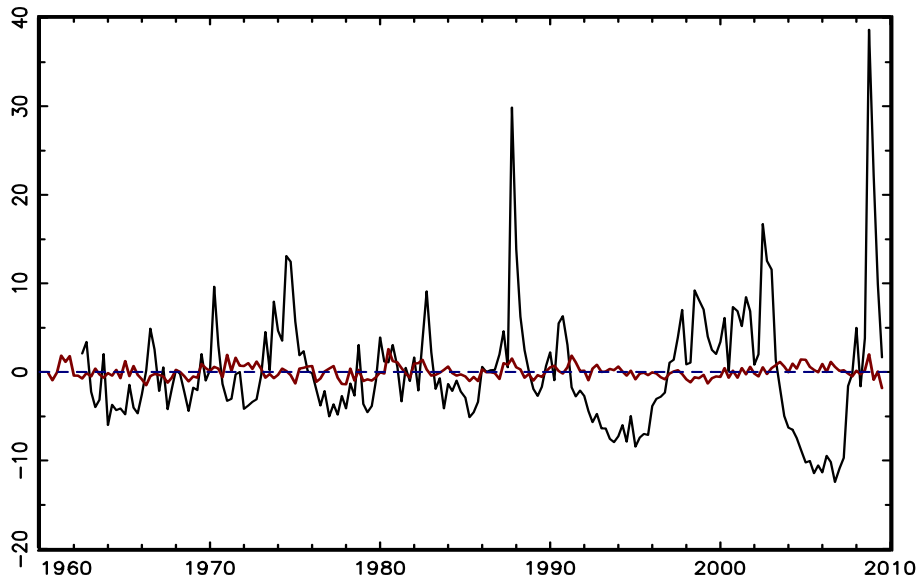


Uncertainty:

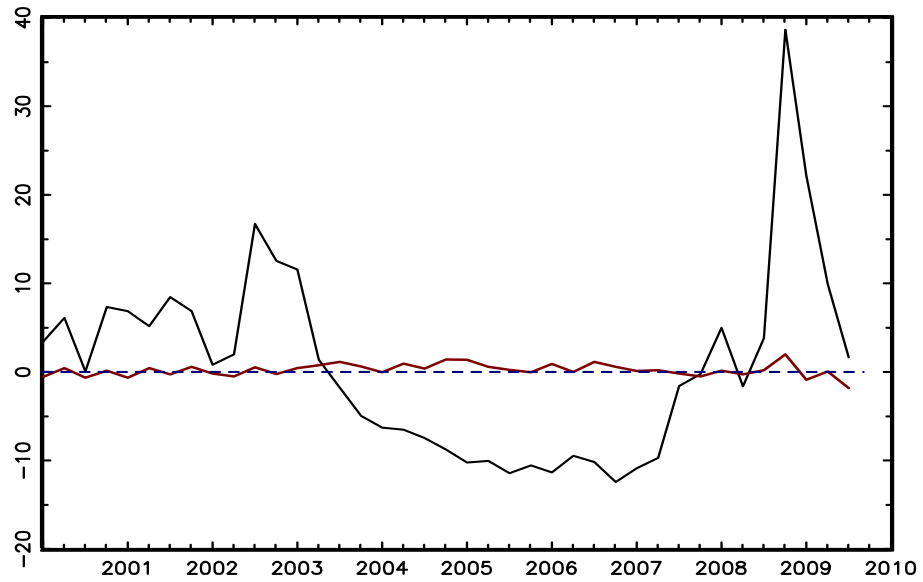
$$Z_t = \lambda'_{VXO} \varepsilon_t$$

$$W_t = \eta_{Oii}, \eta_{Money}, \eta_{Wealth}, \eta_{CreditSpreads}$$

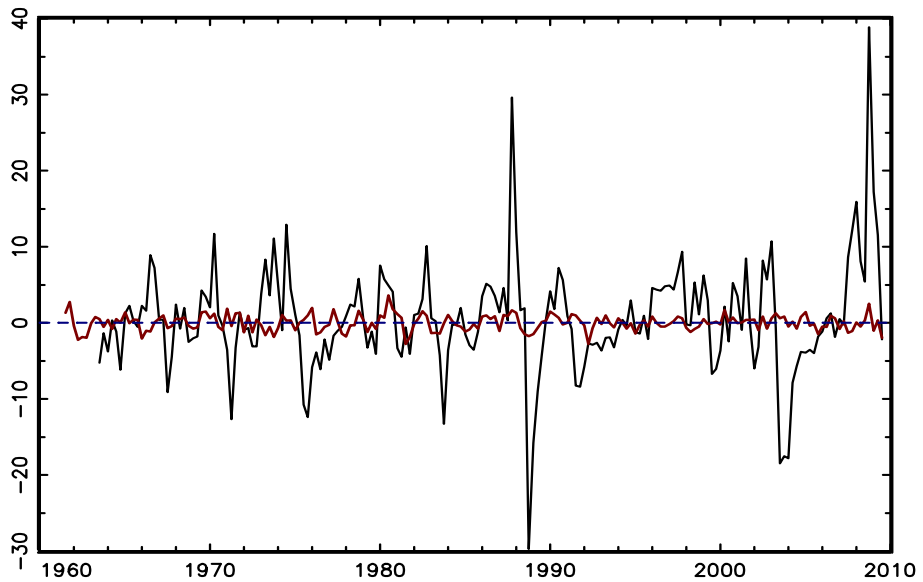
VXO



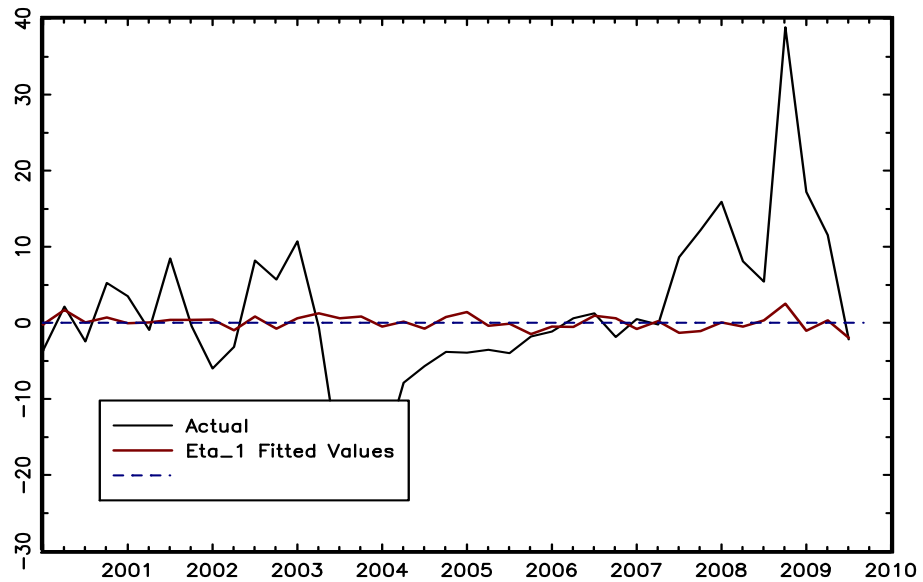
VXO



Year-Over-Year



Year-Over-Year



Question 3: Can the important shocks be associated standard channels (wealth effects, oil prices, credit, etc.) ?

Yes ... with “wealth” and “credit” shocks playing the major role (generally consistent with “standard 2-part story”)

Timing of Forecast Failure (Shocks?)

Survey of Professional Forecasters, 2008Q2 – 2009Q1

	Forecast Publication Date				
Target	5/13/08	8/12/08	11/17/08	2/13/09	Actual
2008Q2	0.2				1.4
2008Q3	1.7	1.2			-2.7
2008Q4	1.8	0.7	-2.9		-5.5
2009Q1	2.3	1.6	-1.1	-5.2	-6.6
2009Q2	2.5	2.1	0.8	-1.8	-0.7
2009Q3		2.5	0.9	1.0	2.7
2009Q4			2.3	1.8	

Lessons:

1. Are Business Cycles All Alike? (Yes ... No)
2. What caused the Great Moderation ?
(Good Policy or Good Luck ?)