# Why Has U.S. Inflation Become Harder to Forecast?

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## Corrected versions of Figures 2-4 and Tables 4-5

The published version of this paper (*Journal of Money, Credit, and Banking*, Supplement to Vol. 39, No. 1 (February 2007)) contains errors in Figures 2-4 and Tables 4-5. This document contains corrected versions of these figures and tables. It also contains versions of Figure 2 for alternative measures of inflation. The errors in the published paper were associated with a coding error in our program for estimating the UC-SV model. We thank Ling Hu of Platinum Grove Asset Management for finding this error and bringing it to our attention. Corrected replication files can be found at http://www.princeton.edu/~mwatson

**Table 4. Pseudo Out-of-Sample Forecasting Performance of Additional Univariate Models: MSFEs, Relative to AR(AIC), GDP inflation**

**(Changes from publication shown in blue)**

| | 1970:I=1983:IV | | | | 1984:I-2004:IV | | | |
|---|---|---|---|---|---|---|---|---|
| **Model** | **h = 1** | **h = 2** | **h = 4** | **h = 8** | **h = 1** | **h = 2** | **h = 4** | **h = 8** |
| ***Recursive forecasts*** | | | | | | | | |
| AR(AIC) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| AR(AIC) Iterated | 1.00 (0.00) | 1.00 (0.06) | 1.02 (0.10) | 1.07 (0.16) | 1.00 (0.00) | 0.98 (0.03) | 1.01 (0.06) | 0.97 (0.10) |
| AO | 1.95 (.69) | 1.57 (.44) | 1.06 (.20) | 1.00 (.22) | 1.22 (.29) | 1.10 (.28) | **0.89** (.18) | **0.84** (.23) |
| MA(1) | **0.82** (.06) | 0.83 (.08) | 0.87 (.12) | 0.89 (.17) | 1.01 (.04) | 1.03 (.06) | 0.98 (.12) | 0.89 (.20) |
| AR(4) | 0.95 (.06) | 1.08 (.07) | 1.05 (.08) | 0.93 (.09) | 0.93 (.03) | 0.96 (.04) | 0.99 (.05) | 0.94 (.07) |
| ***Rolling forecasts*** | | | | | | | | |
| AR(AIC) | 0.97 (.06) | 1.05 (.07) | 0.99 (.09) | **0.83** (.13) | 0.95 (.10) | 1.08 (.13) | 1.17 (.20) | 1.18 (.37) |
| AR(AIC) Iterated | 0.97 (0.06) | 0.97 (0.09) | 0.98 (0.13) | 1.07 (0.20) | 0.95 (0.10) | 0.94 (0.13) | 0.98 (0.19) | 1.01 (0.33) |
| AR(4) | 0.98 (.07) | 1.15 (.09) | 1.06 (.11) | 0.94 (.15) | **0.92** (.09) | 0.95 (.13) | 1.06 (.20) | 1.04 (.37) |
| MA(1) | **0.82** (.06) | **0.82** (.08) | **0.86** (.12) | 0.88 (.18) | 0.99 (.08) | 0.98 (.10) | 0.93 (.14) | 0.87 (.21) |
| ***Nelson-Schwert*** | | | | | | | | |
| NS77 MA(2) | 0.88 (.23) | 0.91 (.27) | 0.95 (.26) | 0.89 (.27) | 0.93 (.09) | **0.91** (.14) | 0.92 (.19) | **0.84** (.25) |
| ***Fixed-parameter models (not pseudo out-of-sample)*** | | | | | | | | |
| UC-SV, $\gamma = 0.2$ | **0.81** | **0.84** | **0.87** | **0.87** | **1.01** | **1.02** | **0.97** | **0.88** |
| MA(1) $\theta = 0.25$ | 0.79 (.07) | 0.80 (.08) | 0.82 (.12) | 0.87 (.17) | 1.05 (.07) | 1.11 (.10) | 1.05 (.15) | 0.93 (.22) |
| MA(1) $\theta = 0.65$ | 0.97 (.26) | 0.94 (.25) | 0.96 (.23) | 0.90 (.24) | 0.90 (.10) | 0.87 (.14) | 0.89 (.18) | 0.82 (.23) |

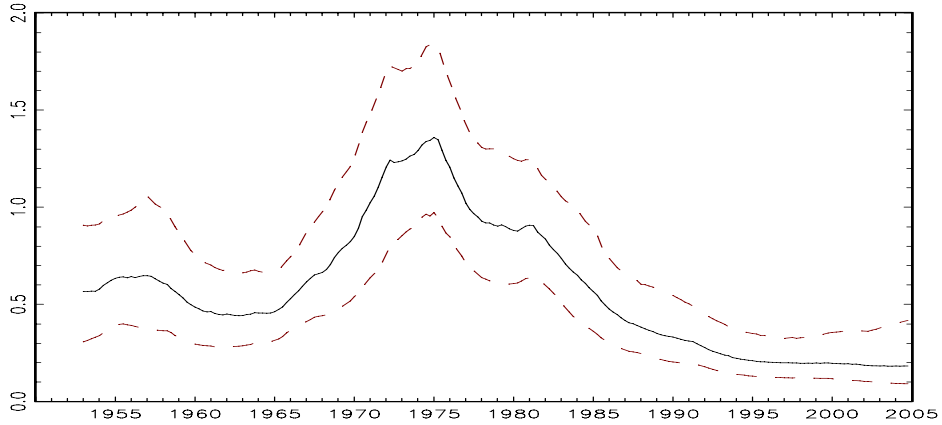
## Table 5. Estimated Models and Forecasting Summary for Other Price Indexes

**(Changes from publication shown in blue)**

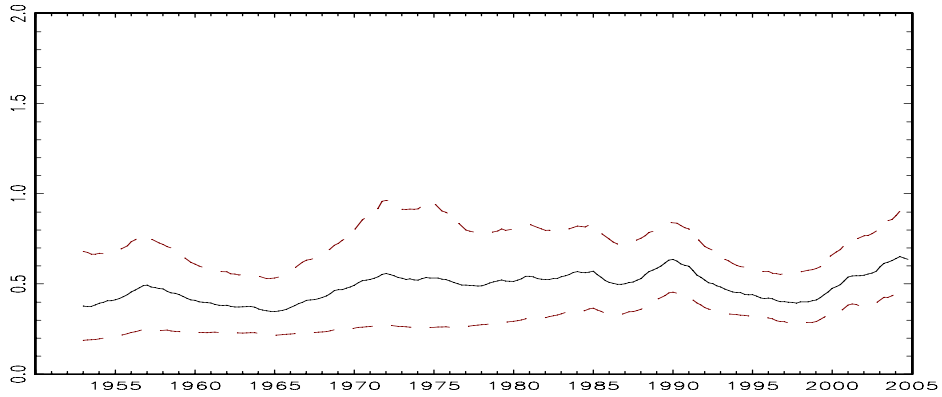
| | PCE-core | | PCE-all | | CPI | |
|---|---|---|---|---|---|---|
| | **1960:I – 1983:IV** | **1984:I – 2004:IV** | **1960:I – 1983:IV** | **1984:I – 2004:IV** | **1960:I – 1983:IV** | **1984:I – 2004:IV** |
| ***(a) IMA parameters: $\Delta\pi_t = (1 - \theta B)a_t$*** | | | | | | |
| $\theta$ | 0.252 (.063) | 0.677 (.094) | 0.249 (.094) | 0.688 (.088) | 0.301 (0.085) | 0.695 (0.085) |
| $\sigma_a$ | 1.053 (.058) | 0.604 (.055) | 1.273 (.080) | 0.966 (.073) | 1.769 (0.097) | 1.333 (0.080) |
| ***(b) UC parameters*** | | | | | | |
| $\sigma_\varepsilon$ | 0.787 (.079) | 0.195 (.063) | 0.957 (.121) | 0.301 (.093) | 1.235 (0.156) | 0.407 (0.110) |
| $\sigma_\eta$ | 0.529 (.074) | 0.497 (.051) | 0.635 (.080) | 0.801 (.072) | 0.971 (0.153) | 1.111 (0.107) |
| ***(c) p-values of Wald Tests of IMA(1,1) versus:*** | | | | | | |
| ARIMA(1,1,1) | 0.32 | 0.33 | 0.98 | 0.91 | 0.72 | 0.01 |
| IMA(1,4) | 0.66 | 0.73 | .004 | 0.46 | <.001 | .002 |
| ***(d) ARIMA(1,0,1) parameters: $(1 - \phi B)\pi_t = (1 - \theta B)a_t$*** | | | | | | |
| $\phi$ | 0.990 (.017) | 0.992 (.008) | 0.986 (.019) | 0.992 (.013) | 0.982 (.021) | 0.986 (.015) |
| $\theta$ | 0.243 (.105) | 0.679 (.083) | 0.240 (.104) | 0.687 (.083) | 0.301 (.102) | 0.693 (.084) |
| ***(e) 90% confidence interval for largest AR root*** | | | | | | |
| | 0.889 - 1.030 | 0.913 - 1.040 | 0.859 - 1.026 | 0.834 - 1.029 | 0.856- 1.025 | 0.721- 1.002 |
| ***(f) Tests for parameter stability*** | | | | | | |
| *t-statistic for* $\sigma_{\varepsilon,70\text{-}83} = \sigma_{\varepsilon,84\text{-}04}$ (*p*-value) | – | –5.89 (<.001) | – | –4.31 (<.001) | – | –4.33 (<.001) |
| *t-statistic for* $\sigma_{\eta,70\text{-}83} = \sigma_{\eta,84\text{-}04}$ (*p*-value) | – | –0.35 (.727) | – | 1.08 (.278) | – | 0.753 (0.452) |
| QLR: UC model (*p*-value) | – | 24.84 (<.01) | – | 17.69 (<.01) | – | 22.33 (<.01) |
| QLR: AR(4) (*p*-value) | – | 4.77 (.01) | – | 5.01 (<.01) | – | 5.91 (<.01) |
| ***(g) 4-quarter ahead pseudo out-of-sample relative MSFEs (recursive AR(AIC) = 1.00)*** | | | | | | |
| | **1970:I – 1983:IV** | **1984:I – 2004:IV** | **1970:I – 1983:IV** | **1984:I – 2004:IV** | **1970:I – 1983:IV** | **1984:I – 2004:IV** |
| AO | 1.14 | **0.71** | 1.13 | 0.74 | 1.11 | 0.78 |
| recursive IMA(1,1) | 0.89 | 0.89 | 0.84 | 0.90 | **0.87** | 0.90 |
| recursive AR(4) | 1.13 | 0.97 | 1.05 | 1.00 | 0.98 | 1.05 |
| rolling AR(AIC) | 0.99 | 1.05 | 0.96 | 0.94 | 0.97 | 0.91 |
| rolling AR(4) | 1.17 | 1.05 | 1.08 | 0.98 | 1.01 | 0.95 |
| rolling IMA(1,1) | **0.87** | 0.81 | **0.82** | 0.80 | 0.87 | 0.85 |
| NS77 MA(2) | 0.99 | 0.75 | 1.01 | **0.73** | 1.04 | **0.70** |
| UC-SV, $\gamma = 0.2$ | **0.89** | **0.84** | **0.88** | **0.77** | **0.88** | **0.86** |

Figure 2 **(Corrected).** Estimates of the standard deviations of the permanent and transitory innovations, and of the implied IMA(1,1) coefficient, using the UC-SV(.2) model: 16.5%, 50%, and 83.5% quantiles of the posterior distributions, GDP deflator, 1953-2004

(a) Standard deviation of permanent innovation, $\sigma_{\varepsilon,t}$




(b) Standard deviation of transitory innovation, $\sigma_{\eta,t}$




(c) Implied IMA(1,1) coefficient $\theta$

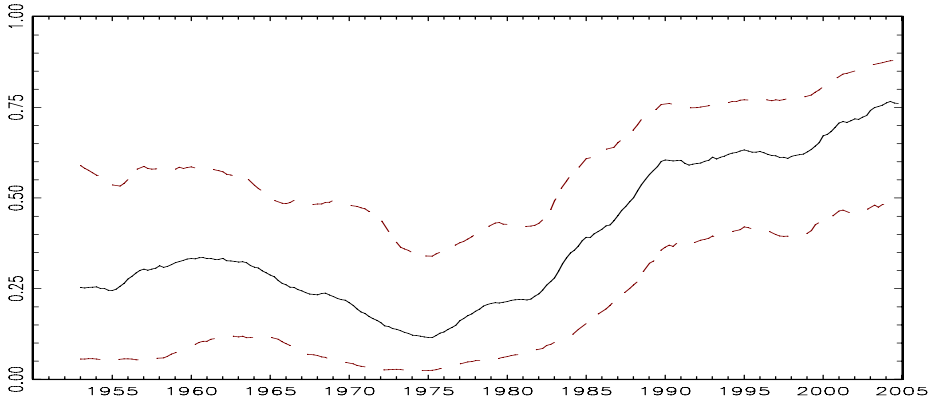


Figure 3 **(UC-SV is Corrected).** Smoothed relative mean squared forecast errors of various forecasts, relative to the recursive AR(AIC) benchmark: GDP deflator

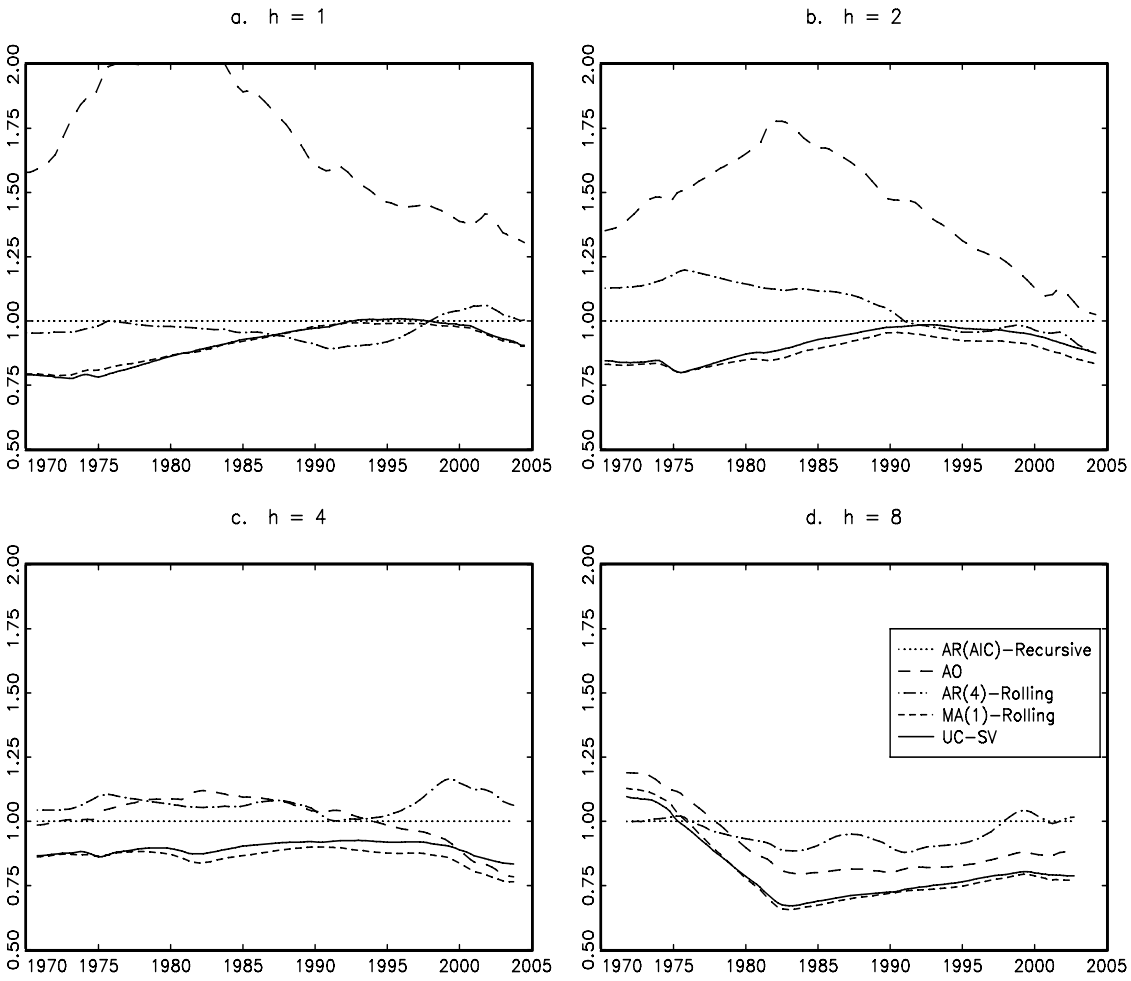


Figure 4 **(UC-SV is Corrected).** Time series plot (upper) and scatterplot (lower) of the residual from the UC-SV model of GDP inflation and the 2-sided unemployment gap. Time series plot: UC-SV resdidual (solid line); $ugap^{2isided}$ (dash-dots). Scatterplot: open circles, 1970–1983; filled circles, 1984–2004.

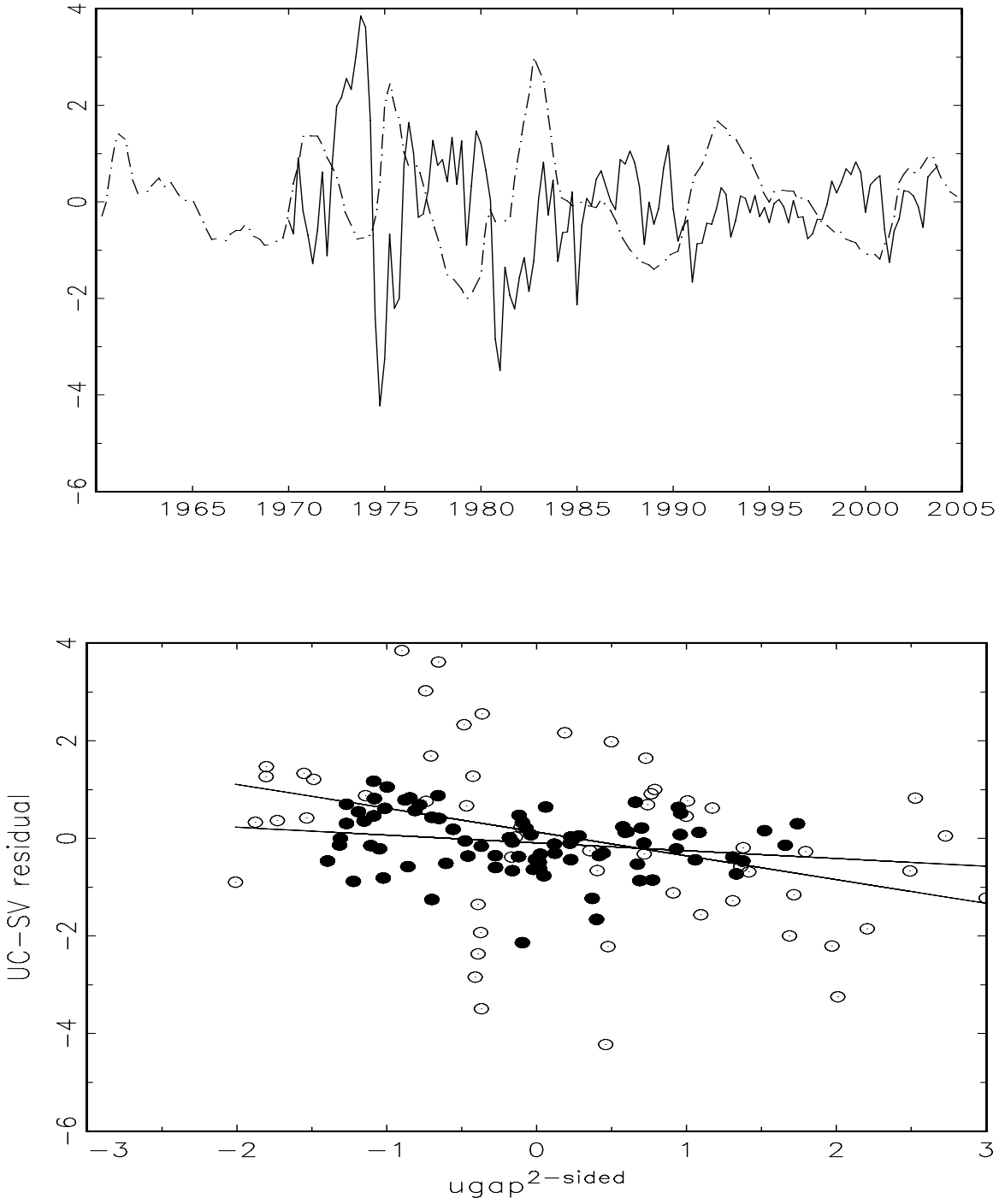
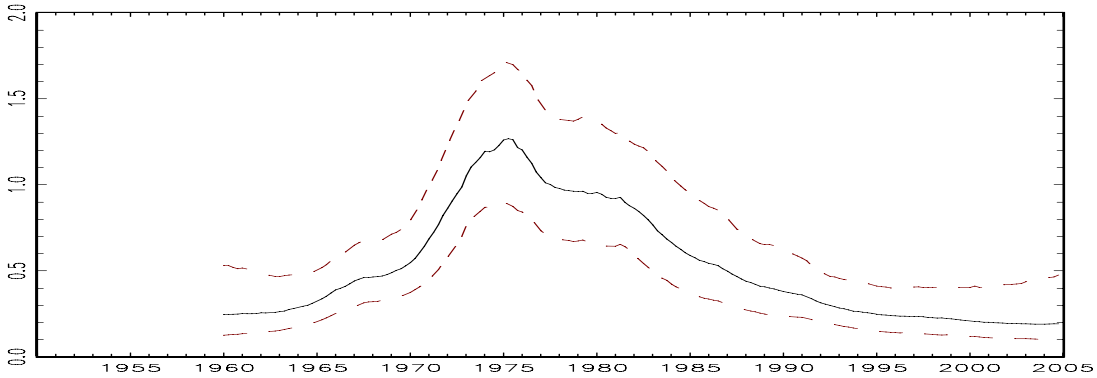
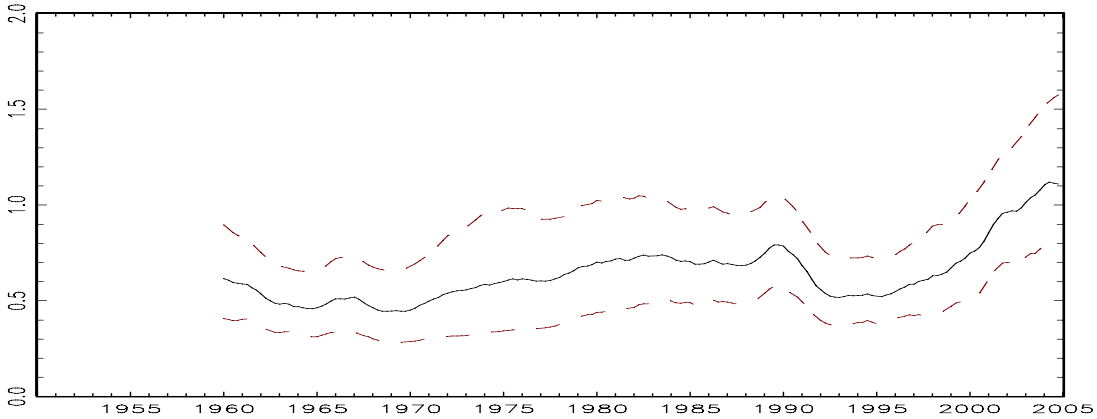


Figure 2 for PCE (All Items): Estimates of the standard deviations of the permanent and transitory innovations, and of the implied IMA(1,1) coefficient, using the UC-SV(.2) model: 16.5%, 50%, and 83.5% quantiles of the posterior distributions, PCE Deflator, All Items, 1960-2004

(a) Standard deviation of permanent innovation, $\sigma_{\varepsilon,t}$




(b) Standard deviation of transitory innovation, $\sigma_{\eta,t}$




(c) Implied IMA(1,1) coefficient $\theta$

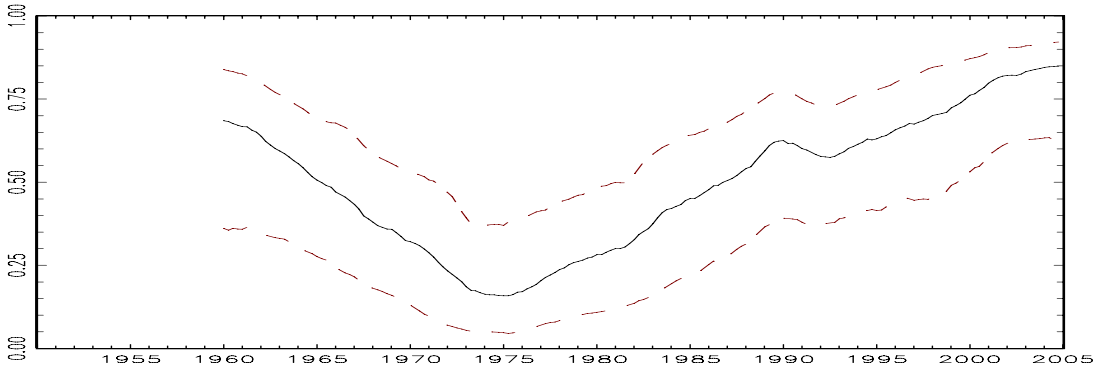
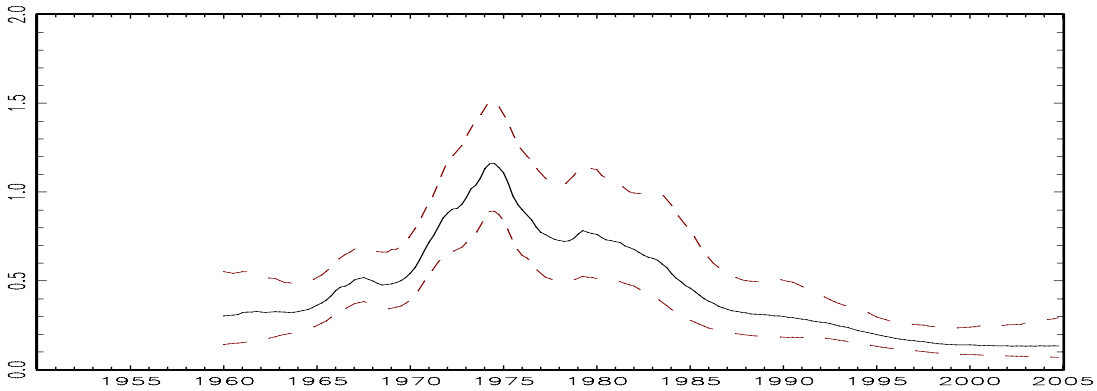
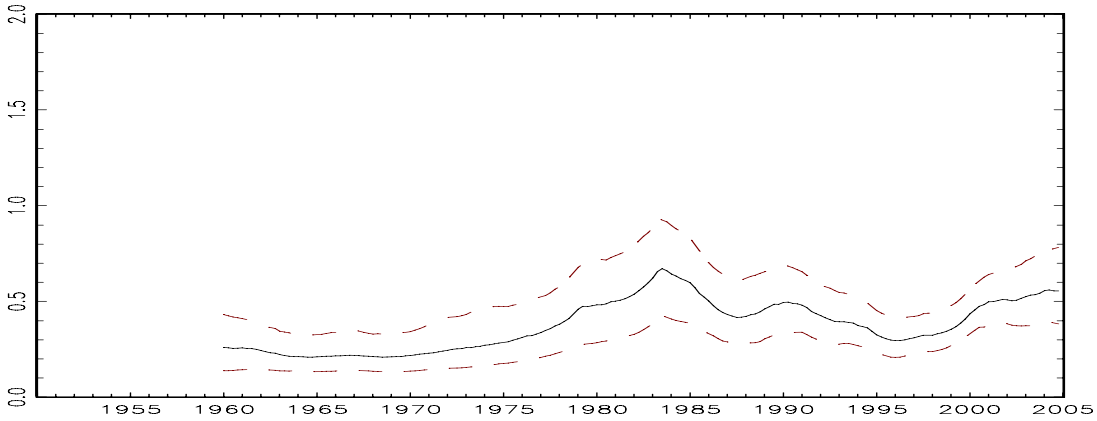


Figure 2 for PCE (Core): Estimates of the standard deviations of the permanent and transitory innovations, and of the implied IMA(1,1) coefficient, using the UC-SV(.2) model: 16.5%, 50%, and 83.5% quantiles of the posterior distributions, PCE Deflator, Core, 1960-2004

(a) Standard deviation of permanent innovation, $\sigma_{\varepsilon,t}$




(b) Standard deviation of transitory innovation, $\sigma_{\eta,t}$




(c) Implied IMA(1,1) coefficient $\theta$

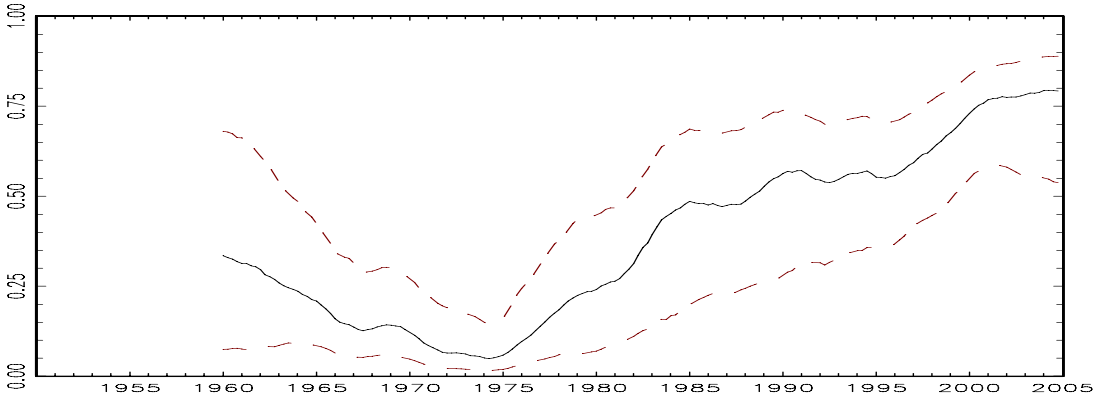
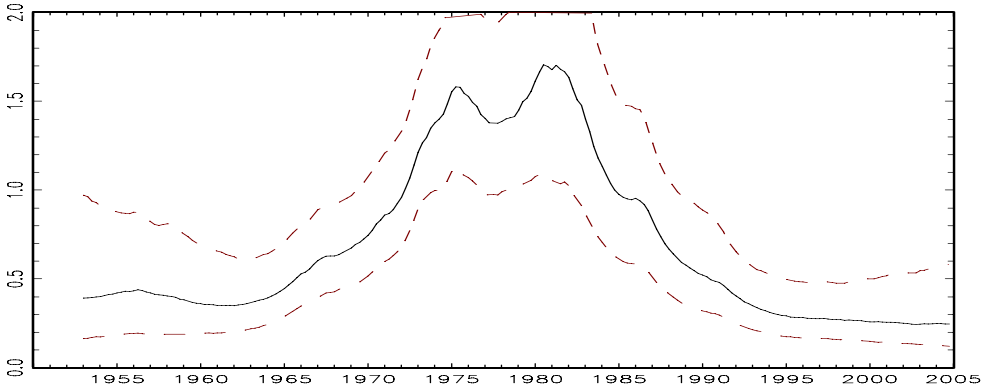
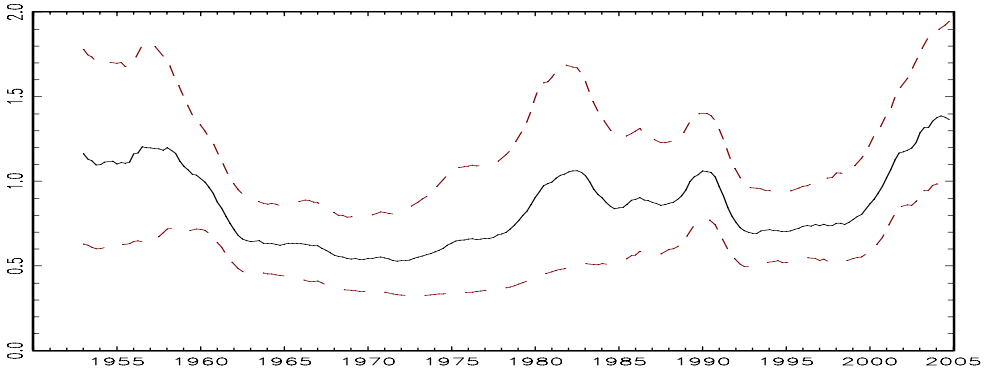


Figure 2 for CPIU (All Items): Estimates of the standard deviations of the permanent and transitory innovations, and of the implied IMA(1,1) coefficient, using the UC-SV(.2) model: 16.5%, 50%, and 83.5% quantiles of the posterior distributions, CPIU, All Items, 1953-2004,

(a) Standard deviation of permanent innovation, $\sigma_{\varepsilon,t}$




(b) Standard deviation of transitory innovation, $\sigma_{\eta,t}$




(c) Implied IMA(1,1) coefficient $\theta$