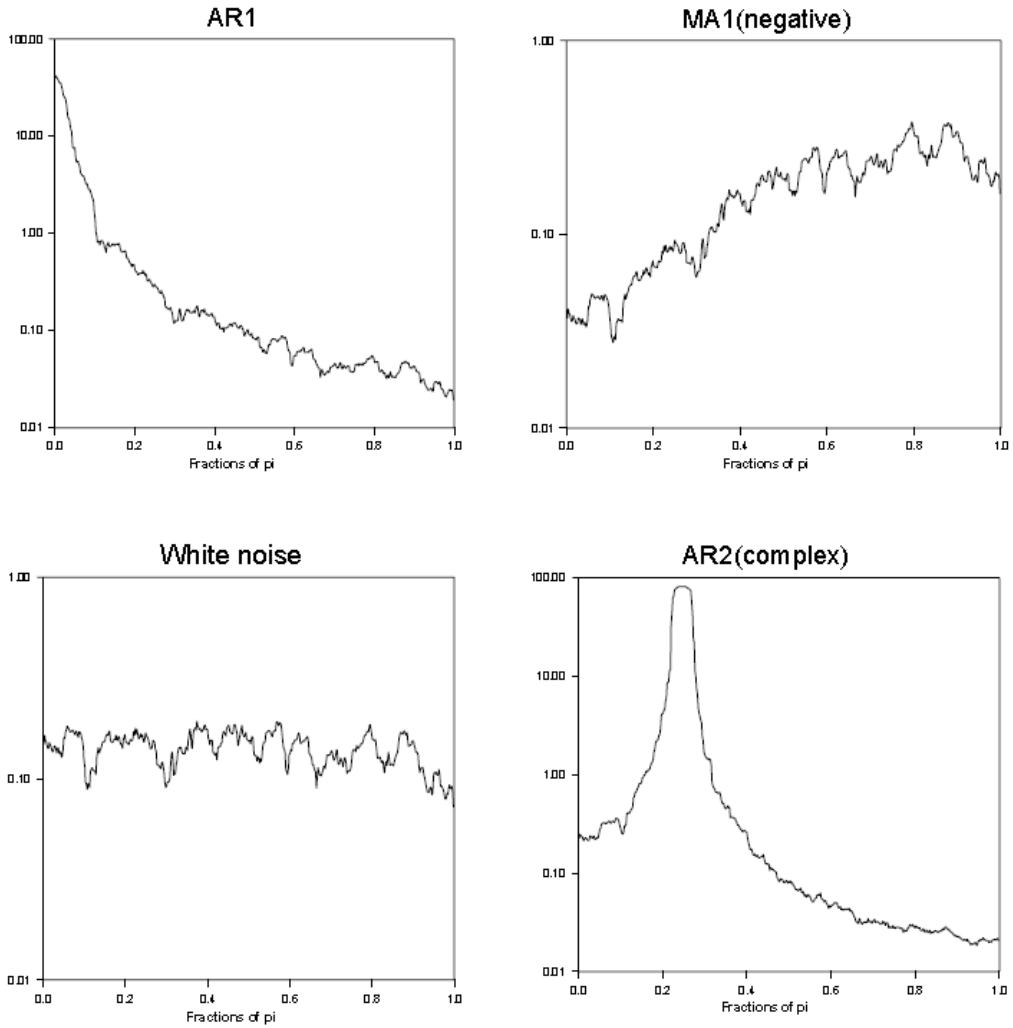
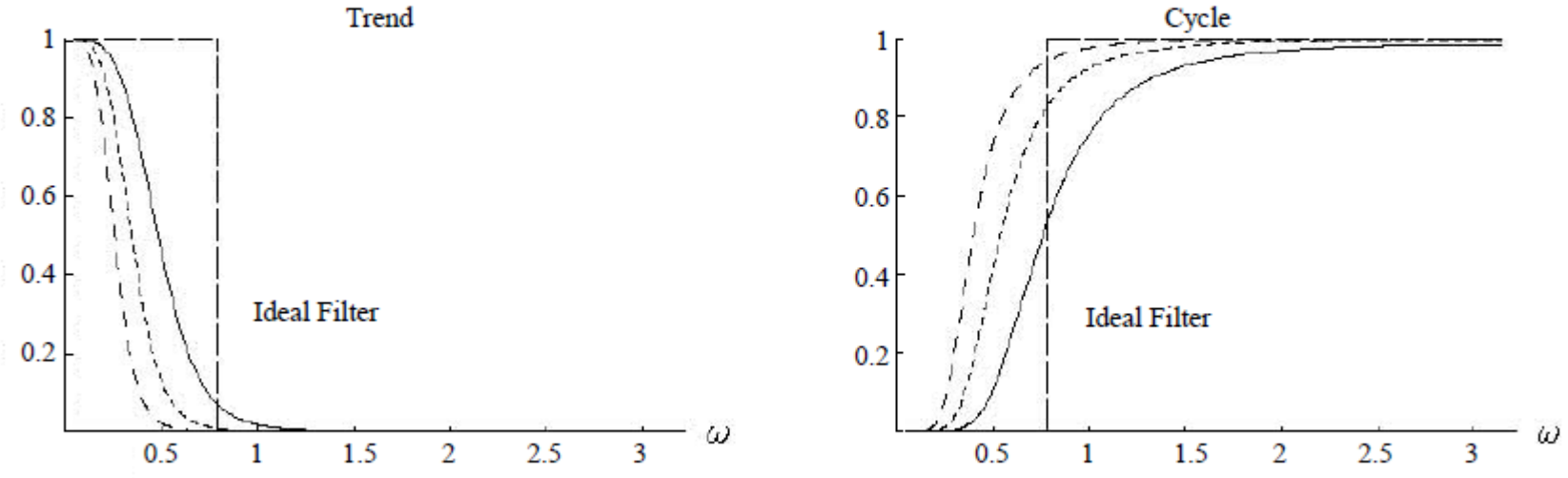
Examples of spectral densities:



Gain Function of the Trend and the Cyclical Component of the HP Filter for Different Values for λ



$\lambda = 8$ $\lambda = 30$ $\lambda = 100$

From paper by Matthias Mohr

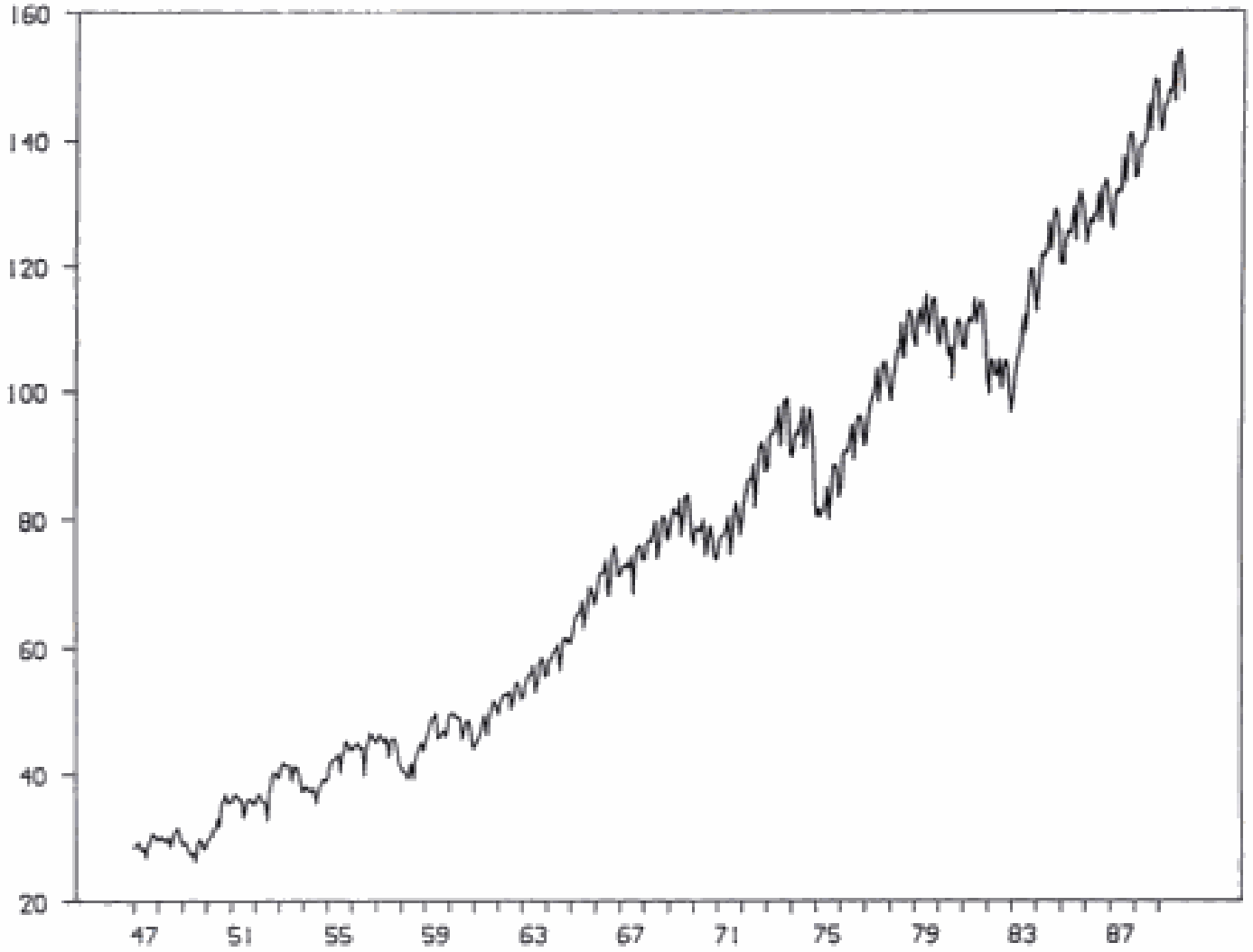


FIGURE 6.3 Federal Reserve Board's seasonally unadjusted index of industrial production for U.S. manufacturing, monthly 1947:1 to 1989:11.

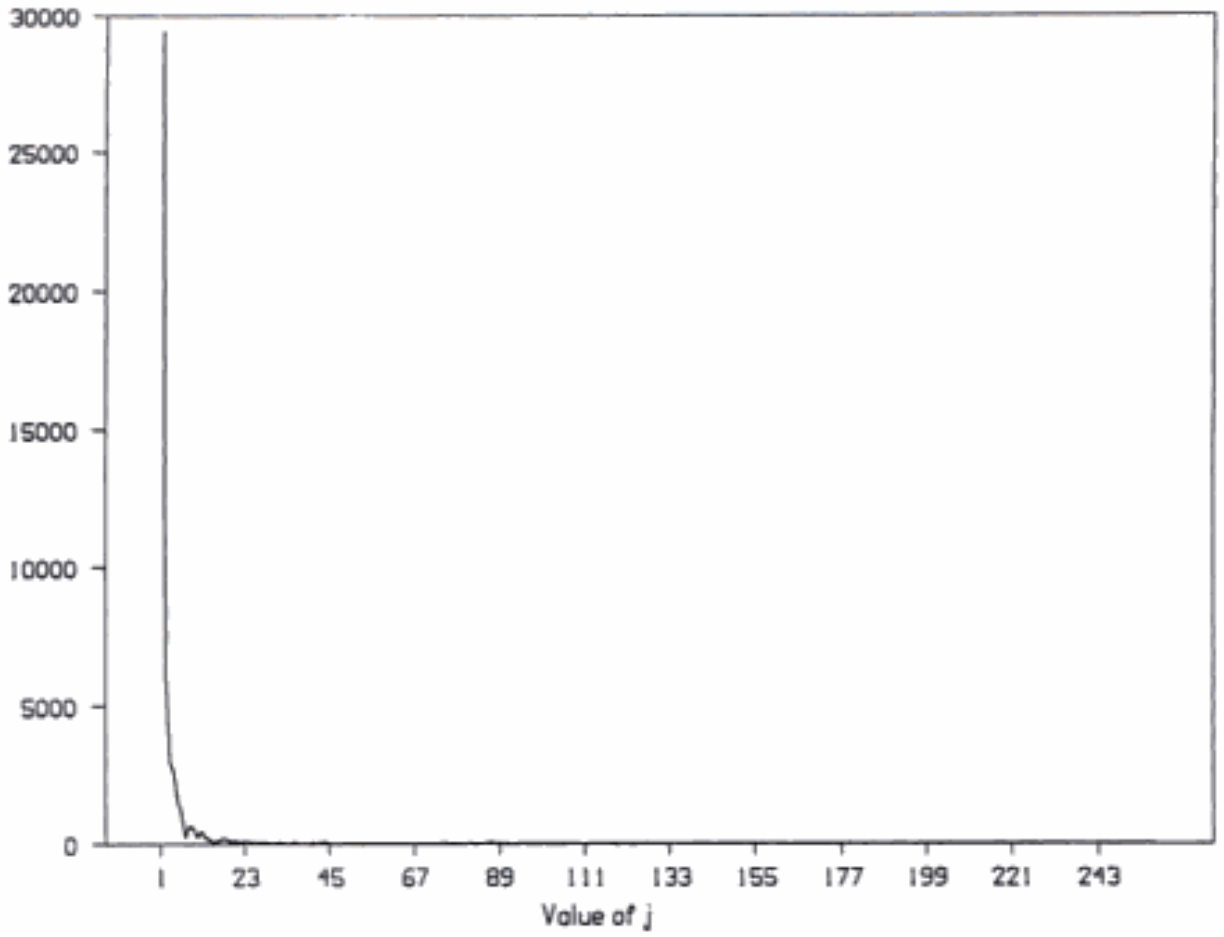


FIGURE 6.4 Sample periodogram for the data plotted in Figure 6.3. The figure plots $\hat{s}_y(\omega_j)$ as a function of j, where $\omega_j = 2\pi j/T$.

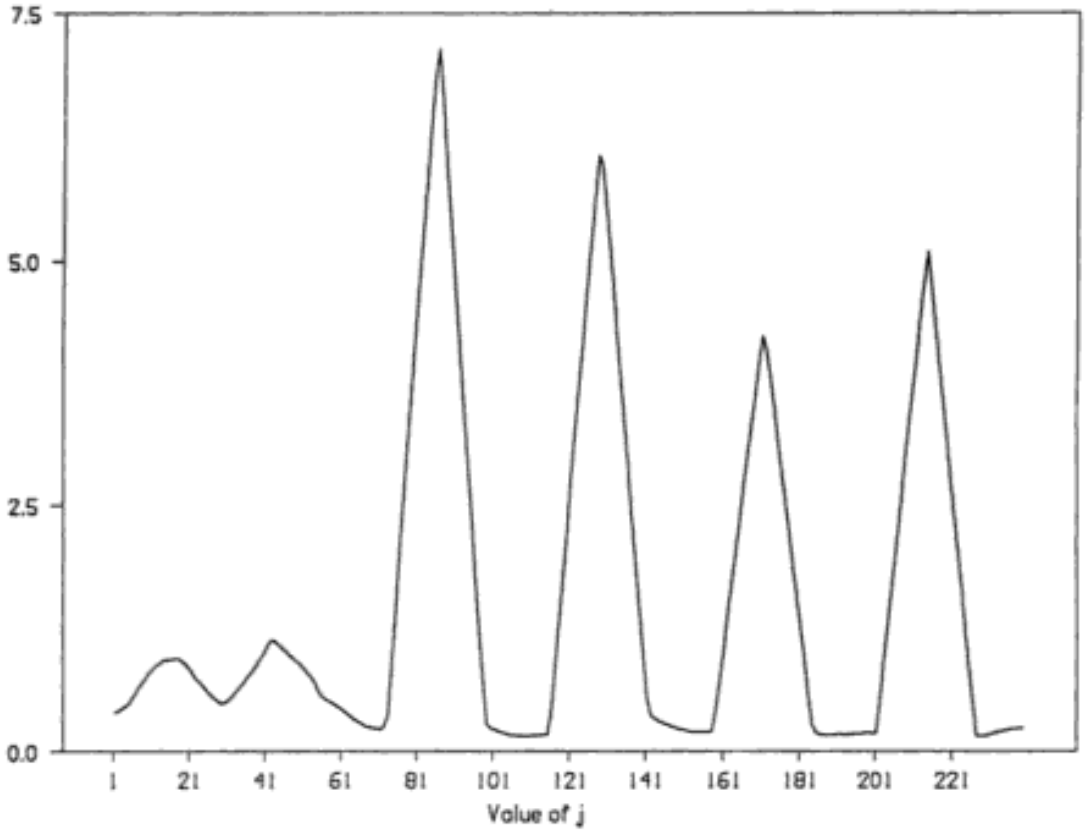
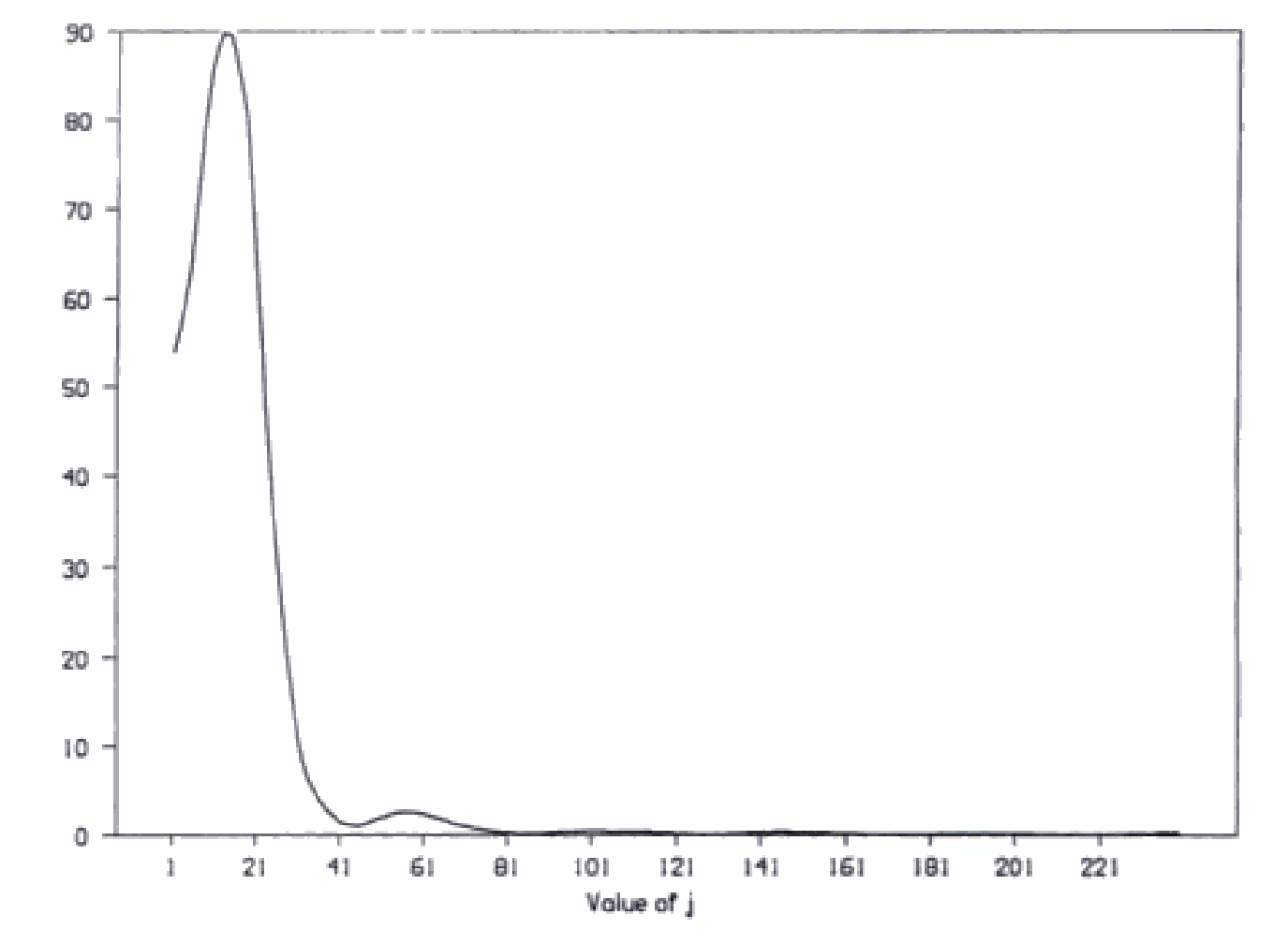


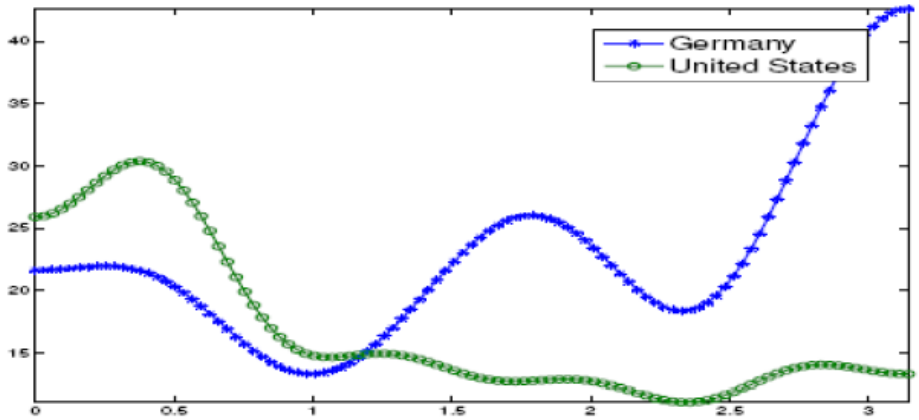
FIGURE 6.5 Estimate of the spectrum for monthly growth rate of industrial production, or spectrum of 100 times the first difference of the log of the series in Figure 6.3.

Detrending month on month



Detrending year on year

Figure 1: Spectral densities: Germany and the US, 1970-1989



Source: LUCREZIA REICHLIN, DOMENICO GIANNONE and MICHELE LENZA, (2008)

Business Cycles in the Euro Area

Using spectra to detect measurement error

A way to assess the importance of measurement error is to look at the spectral density of quarterly GDP growth at different frequencies.

A series for which measurement error explains a large component of the total volatility, should have the bulk of variance concentrated at high frequencies.

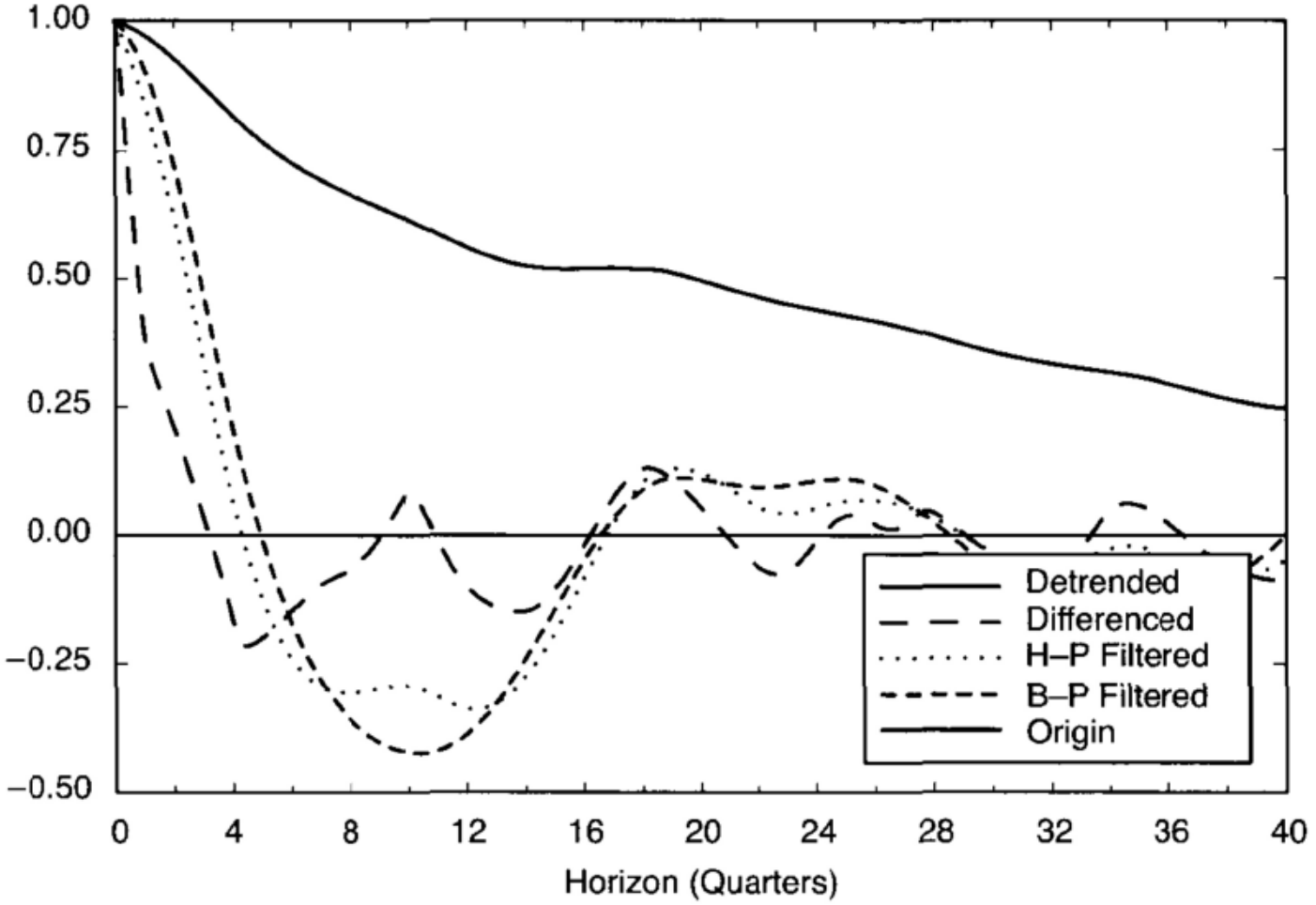


Figure 4.1 Sample autocorrelations of output.

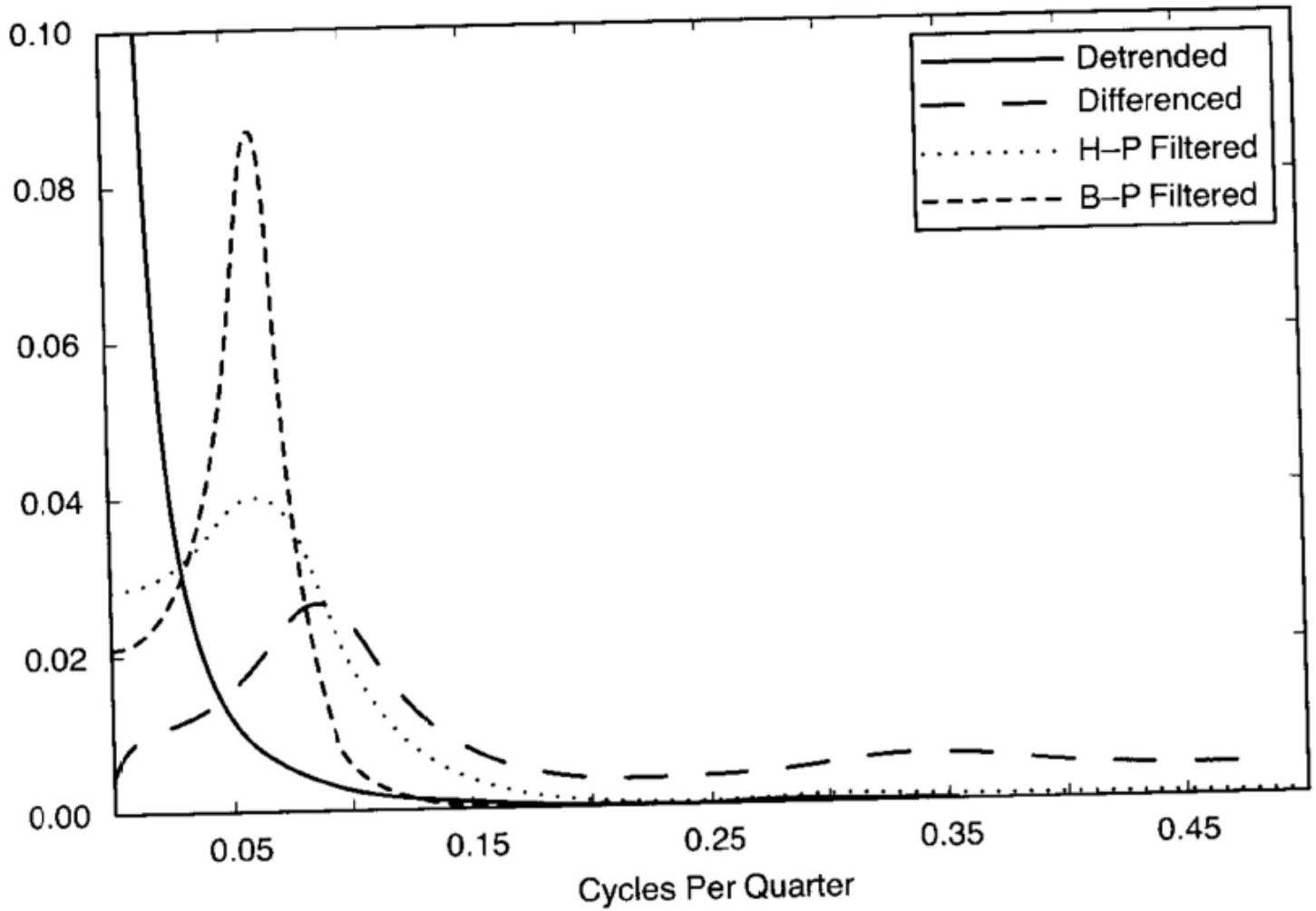


Figure 4.2 Spectra of output.

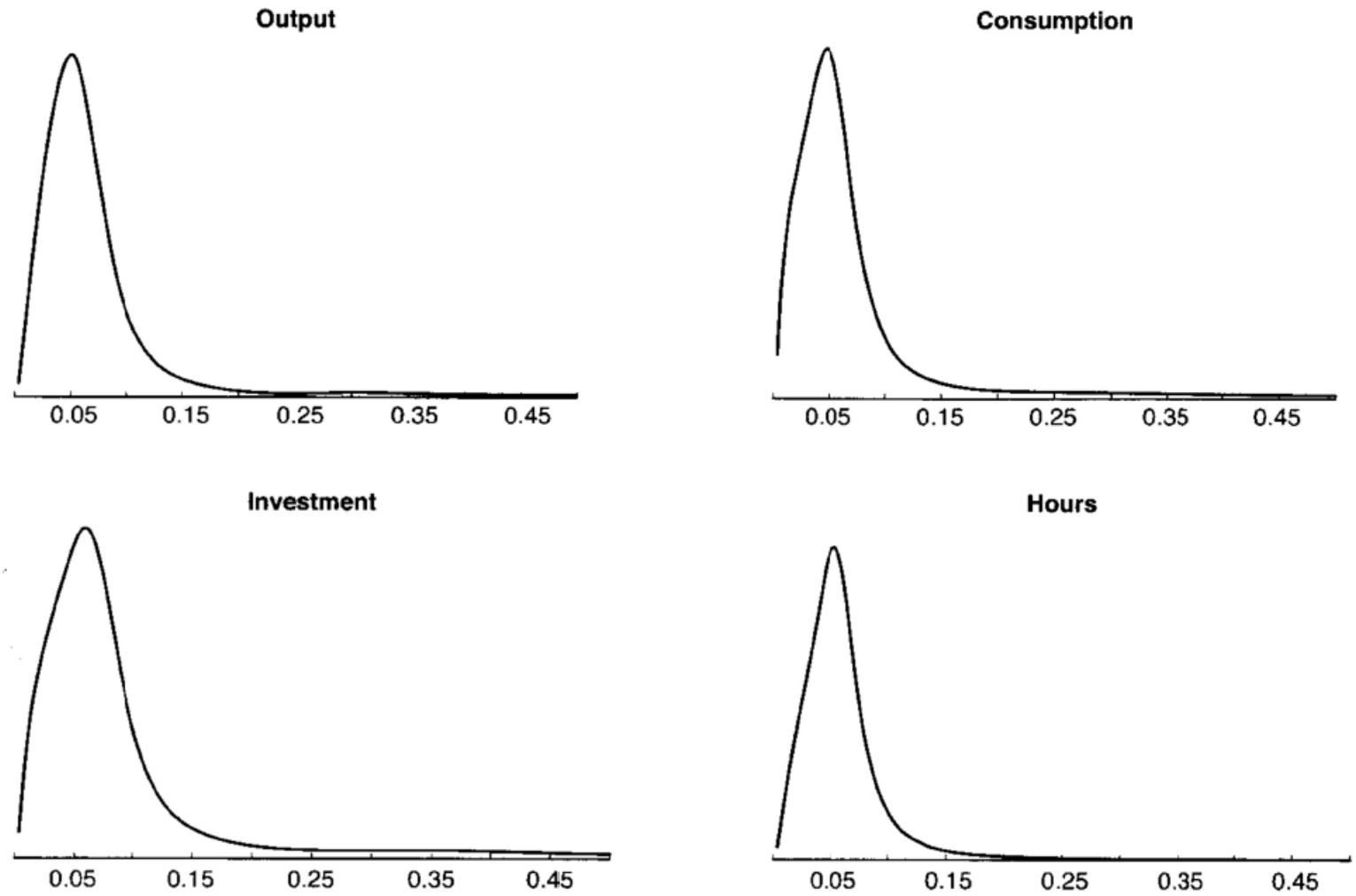


Figure 4.3 Spectra of H-P filtered data.

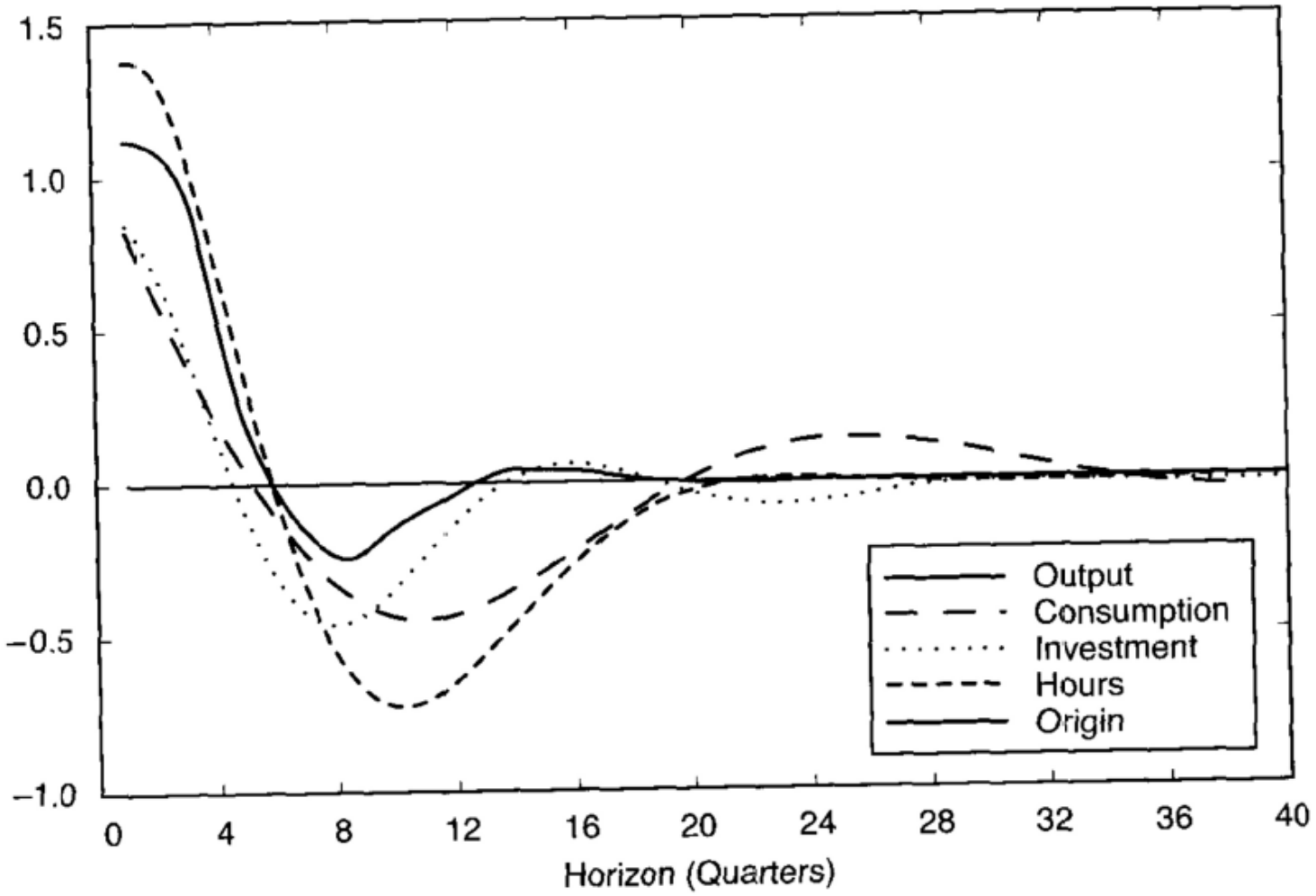


Figure 4.4 Univariate impulse response functions of H-P filtered data.

TABLE 4.1
Summary statistics estimated from VAR

Differenced Data					
j	σ_j	$\frac{\sigma_j}{\sigma_y}$	$\varphi(1)$	$\varphi_{j,y}(0)$	$\varphi_{j,y}(1)$
y	0.0099	1.00	0.36	1.00	0.36
c	0.0051	0.51	0.22	0.54	0.42
i	0.0505	5.10	0.14	0.91	0.21
h	0.0091	0.92	0.60	0.69	0.32
H-P filtered Data					
j	σ_j	$\frac{\sigma_j}{\sigma_y}$	$\varphi(1)$	$\varphi_{j,y}(0)$	$\varphi_{j,y}(1)$
y	0.0177	1.00	0.86	1.00	0.86
c	0.0081	0.46	0.83	0.82	0.75
i	0.0748	4.23	0.79	0.95	0.80
h	0.0185	1.05	0.90	0.83	0.62
B-P filtered Data					
j	σ_j	$\frac{\sigma_j}{\sigma_y}$	$\varphi(1)$	$\varphi_{j,y}(0)$	$\varphi_{j,y}(1)$
y	0.0184	1.00	0.94	1.00	0.94
c	0.0084	0.46	0.94	0.90	0.85
i	0.0733	3.98	0.92	0.96	0.89
h	0.0193	1.05	0.94	0.87	0.71

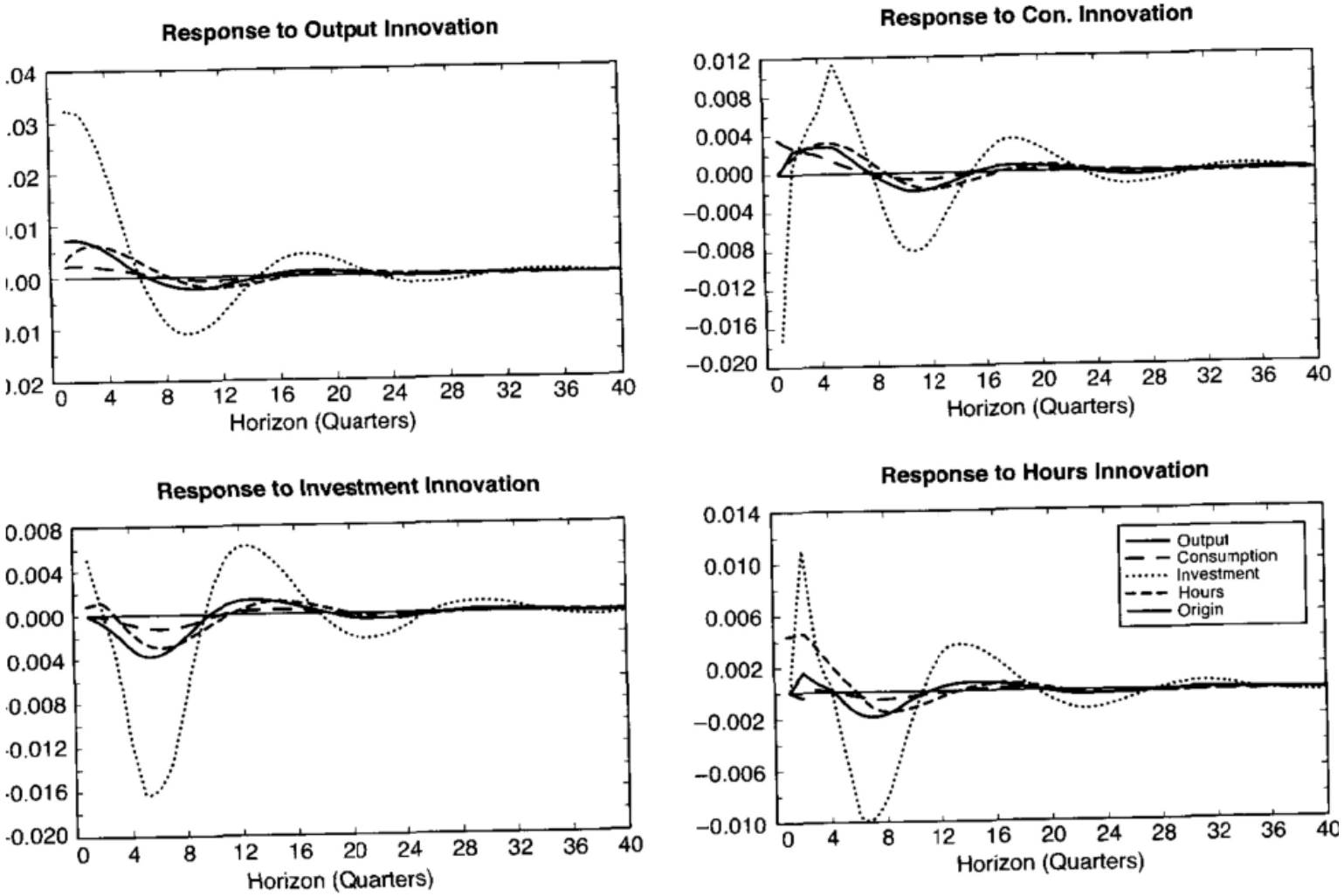


Figure 4.5 System impulse response functions of H-P filtered data.