Unemployment Fluctuations and Stabilization Policies: A New Keynesian Perspective

Lecture II: Unemployment, the Output Gap and the Welfare Costs of Fluctuations

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Two Views about Economic Fluctuations

- "Keynesian"

  - ugly face of capitalism
  - recessions as periods in which the economy operates below the *efficient* level of activity and resource utilization.
  - calls for stabilization policies

- "RBC"

  - cyclical fluctuations as the economy's efficient response to a variety of exogenous disturbances
  - stabilization policies likely to be counterproductive

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- Challenge: unobservability of the *efficient* level of output and, hence, of the *output gap*.

What I Do in this Lecture

- A new measure of the *output gap*

  - consistent with the New Keynesian model developed in Lecture 1, but more general.
  - under certain assumptions $\Rightarrow$ index of the economy's slack relative to the first-best allocation,

- Implications for welfare, using a measure of the deadweight losses associated with inefficient fluctuations
- Evidence based on quarterly data for the U.S. and the Euro area

Previous Approaches

- Traditional output gap measures

  - natural output proxied by a smooth function of time

- Measures based on real marginal cost

  - under competitive labor markets (plus other auxiliary assumptions)

$$\widehat{mc}_t = (1+\varphi)\ \widetilde{y}_t$$

$$\widehat{mc}_t = \widehat{s}_t$$

  - used in empirical estimates of the New Keynesian Phillips curve (e.g., Galí-Gertler, Sbordone)

- Measures based on wedges (GGL, CKM,...)

$$\begin{aligned} gap_t &= mrs_t - mpn_t \\ &= (c_t + \varphi n_t + \xi_t) - (y_t - n_t + \log(1-\alpha)) \end{aligned}$$

  - main shortcoming: unobservability of labor supply shifter ξ_t.

- Present approach: exploits connection with unemployment rate

A New Measure of the Output Gap

- Underlying framework: deviations from efficient output result from

  - market power by firms and workers
  - variations in average wage and price markups due to nominal rigidities

- Average price markup

$$\begin{aligned}\mathcal{M}_t^p &= \frac{P_t}{\frac{W_t}{(1-\alpha)(Y_t/N_t)}} \\ &= \frac{(1-\alpha)(Y_t/N_t)}{W_t/P_t}\end{aligned}$$

- Average wage markup

$$\mathcal{M}_t^w = \frac{W_t/P_t}{\chi_t C_t N_t^{\varphi}}$$

- Goods market clearing condition:

$$C_t = Y_t$$

- Equilibrium employment and output

$$N_t = \left(\frac{1-\alpha}{\mathcal{M}_t \chi_t} \right)^{\frac{1}{1+\varphi}}$$

$$Y_t = A_t \left(\frac{1-\alpha}{\mathcal{M}_t \chi_t} \right)^{\frac{1-\alpha}{1+\varphi}}$$

where $\mathcal{M}_t \equiv \mathcal{M}_t^p \mathcal{M}_t^w \geq 1$ is a *composite markup*.

- Efficient employment and output: $\mathcal{M}_t = 1$, for all t

$$N_t^e = \left(\frac{1-\alpha}{\chi_t} \right)^{\frac{1}{1+\varphi}}$$

$$Y_t^e = A_t \left(\frac{1-\alpha}{\chi_t} \right)^{\frac{1-\alpha}{1+\varphi}}$$

- Output gap

$$x_t \equiv y_t - y_t^e = -\left(\frac{1-\alpha}{1+\varphi} \right) (\mu_t^p + \mu_t^w)$$

where $\mu_t^p \equiv \log \mathcal{M}_t^p$ and $\mu_t^w \equiv \log \mathcal{M}_t^w$

Measuring the Price Markup

- Following Rotemberg and Woodford (1999)

$$\begin{aligned}\mathcal{M}_t^p &= \frac{P_t}{\frac{W_t}{(1-\alpha)(Y_t/N_t)}} \\ &= (1-\alpha)\,\frac{P_t Y_t}{W_t N_t} \\ &= \frac{1-\alpha}{S_t}\end{aligned}$$

Implying

$$\mu_t^p = -s_t + \log(1-\alpha)$$

- Calibration of α: given $\mathcal{M}^p$

$$\alpha = 1 - S\mathcal{M}^p$$

Measuring the Wage Markup

- Representative household with a continuum of members, indexed by $(i,j) \in [0,1] \times [0,1]$
- Continuum of differentiated labor services, indexed by $i \in [0,1]$
- Disutility from (indivisible) labor: $\chi_t j^{\varphi}$, where $\varphi \geq 0$
- Full consumption risk sharing within the household
- Household utility: $E_0 \sum_{t=0}^{\infty} \beta^t \; U(C_t, \{N_t(i)\}, \chi_t)$

$$\begin{aligned} U_t(C_t, \{N_t(i)\}, \chi_t) &\equiv \log C_t - \chi_t \int_0^1 \int_0^{N_t(i)} j^{\varphi} \; dj \; di \\ &= \log C_t - \chi_t \int_0^1 \frac{N_t(i)^{1+\varphi}}{1+\varphi} \; di \end{aligned}$$

where $\chi_t \equiv \exp\{\zeta_t\}$ is a preference shifter.

Measuring the Wage Markup

- Participation condition for an individual (i, j):

$$\left(\frac{1}{C_t}\right)\left(\frac{W_t(i)}{P_t}\right) \geq \chi_t \, j^{\varphi}$$

- Marginal participant $L_t(i)$:

$$\frac{W_t(i)}{P_t} = \chi_t C_t L_t(i)^{\varphi}$$

- Taking logs and integrating over i,

$$w_t - p_t = c_t + \varphi l_t + \xi_t$$

where $l_t \equiv \int_0^1 l_t(i) \, di$ is the (log) *labor force*.

- Unemployment rate

$$u_t \equiv l_t - n_t$$

Measuring the Wage Markup

- Recall: aggregate participation equation

$$w_t - p_t = c_t + \varphi l_t + \xi_t$$

- Average wage markup:

$$\mathcal{M}_t^w = \frac{W_t / P_t}{\chi_t C_t N_t^{\varphi}}$$

implying

$$\begin{aligned} \mu_t^w &= (w_t - p_t) - (c_t + \varphi n_t + \xi_t) \\ &= (w_t - p_t) - (c_t + \varphi l_t + \xi_t) + \varphi(l_t - n_t) \\ &= \varphi u_t \end{aligned}$$

- Relation robust to:

- to alternative specifications of the wage setting process
- to time-varying desired wage markups
- to alternative specifications of the utility function (with smaller wealth effects)

Measuring the Output Gap

- Proposed Output Gap Measure

$$\begin{aligned} x_t &\equiv y_t - y_t^e \\ &= -\left(\frac{1-\alpha}{1+\varphi}\right)(\mu_t^p + \mu_t^w) \\ &= \left(\frac{1-\alpha}{1+\varphi}\right)(s_t - \varphi u_t - \log(1-\alpha)) \end{aligned}$$

- Calibration

Technology: $\alpha = 0.25$

- consistent with average price markups between 10 and 20%
- alternative: $\alpha = 0.38$ (consistent with zero markups, given $S = 0.62$)

Preferences: $\varphi = 5$

- implied Frisch labor supply elasticity: 0.2
- alternatives: $\varphi = 1$ (high elasticity) and $\varphi = 10$ (low elasticity)

- Evidence

Figure 2a. The Output Gap in the U.S.

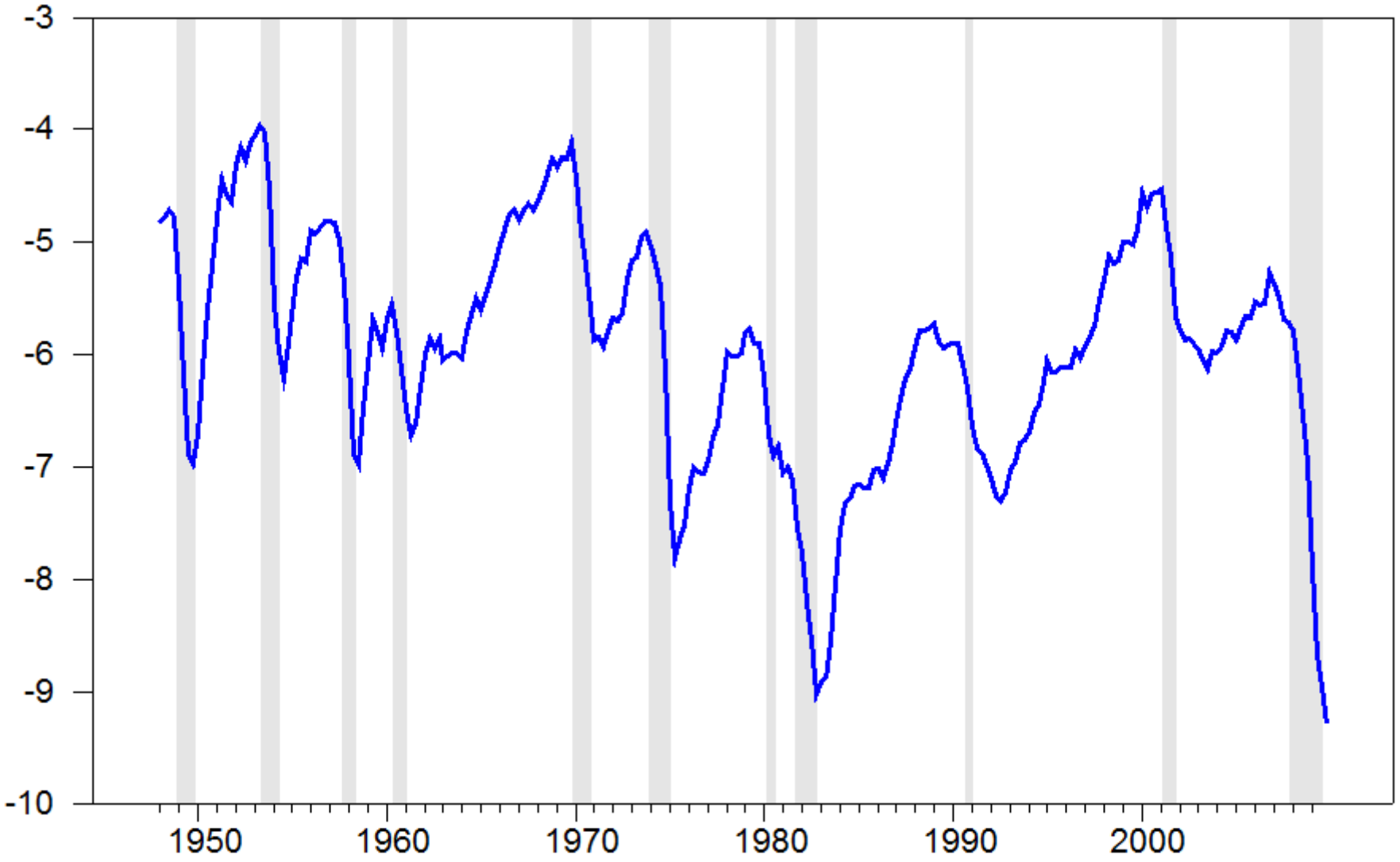


Figure 2b. The Output Gap in the Euro Area

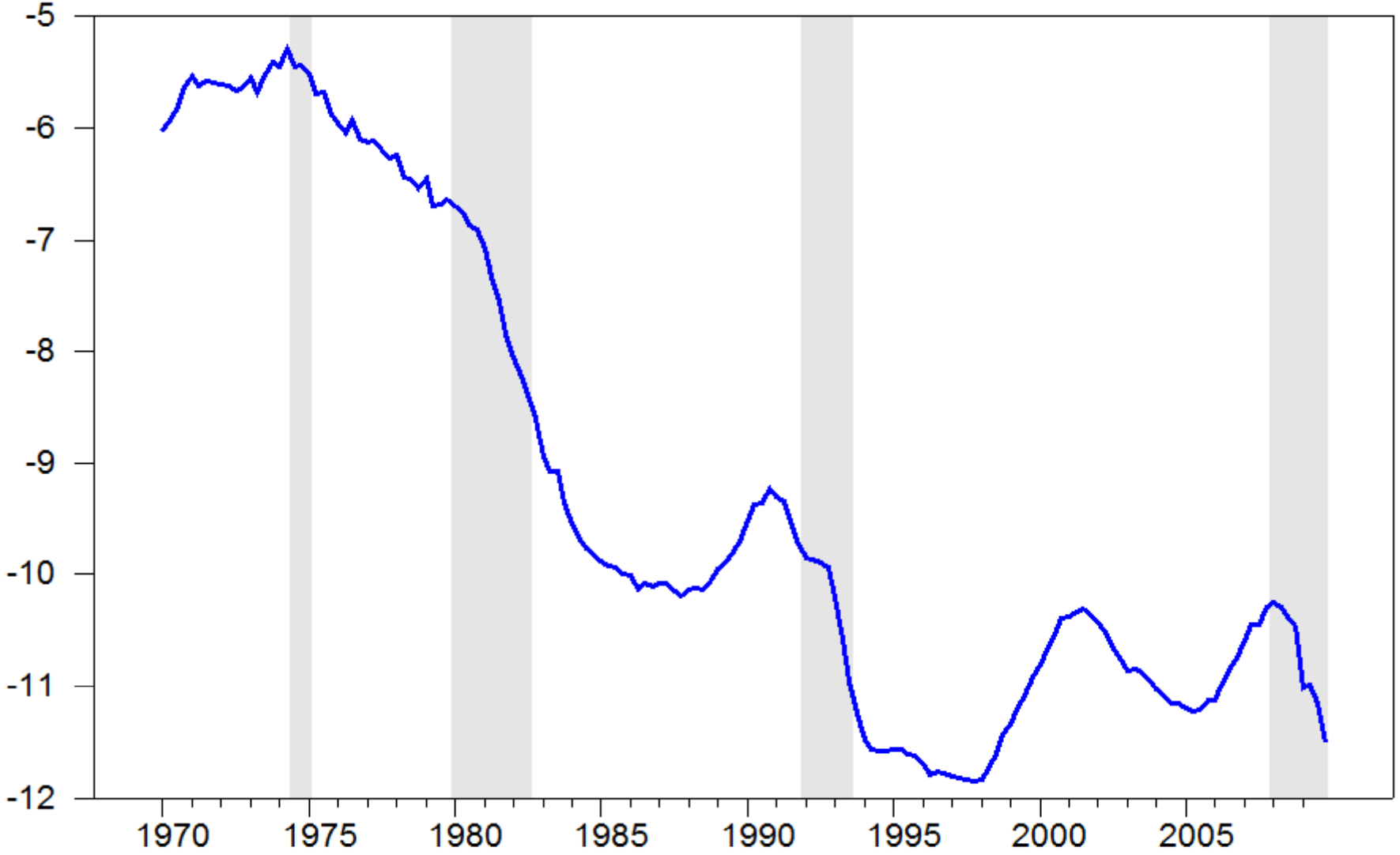


Figure 3a. The Output Gap and its Components in the U.S.

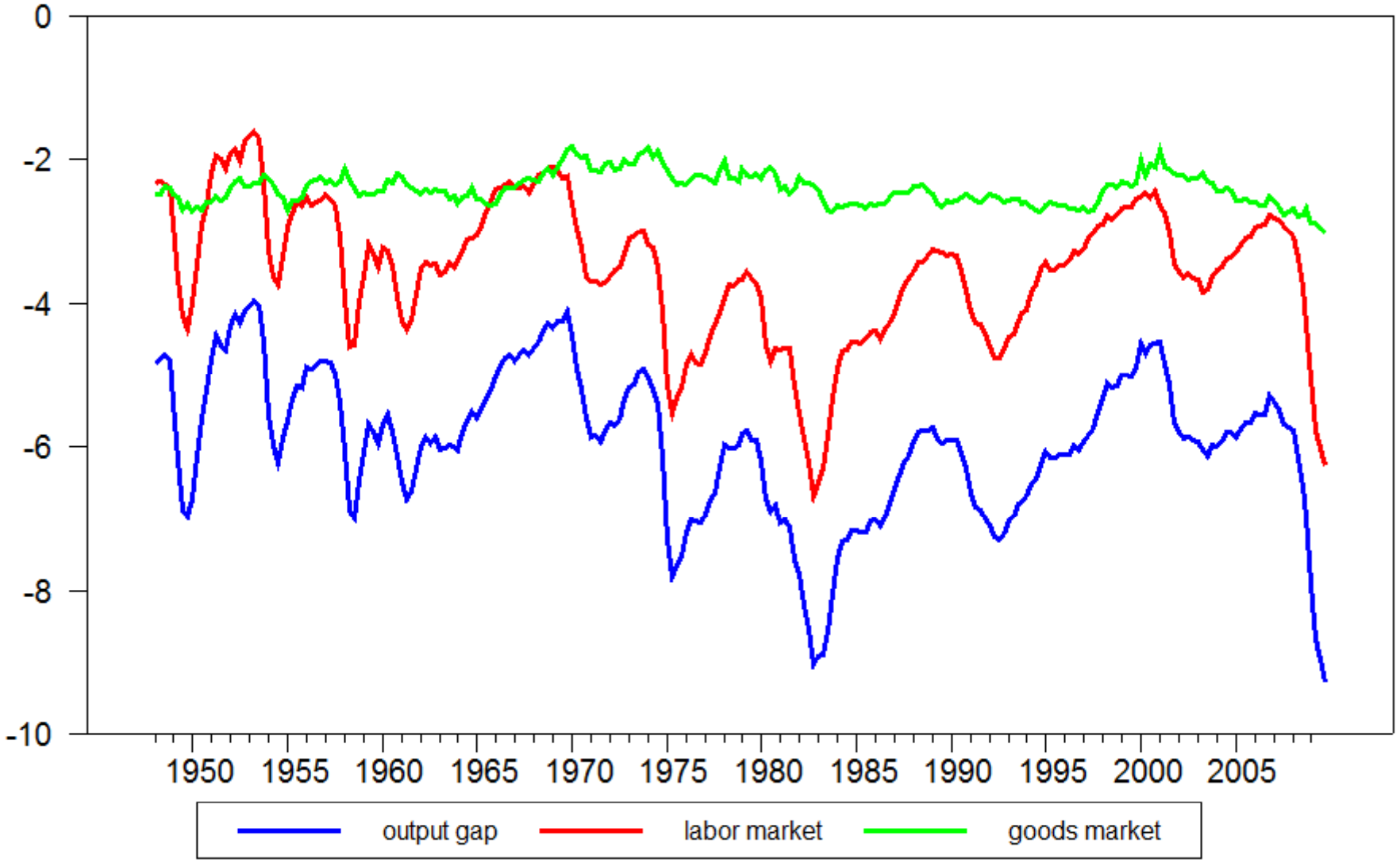


Figure 3b. The Output Gap and its Components in the Euro Area.

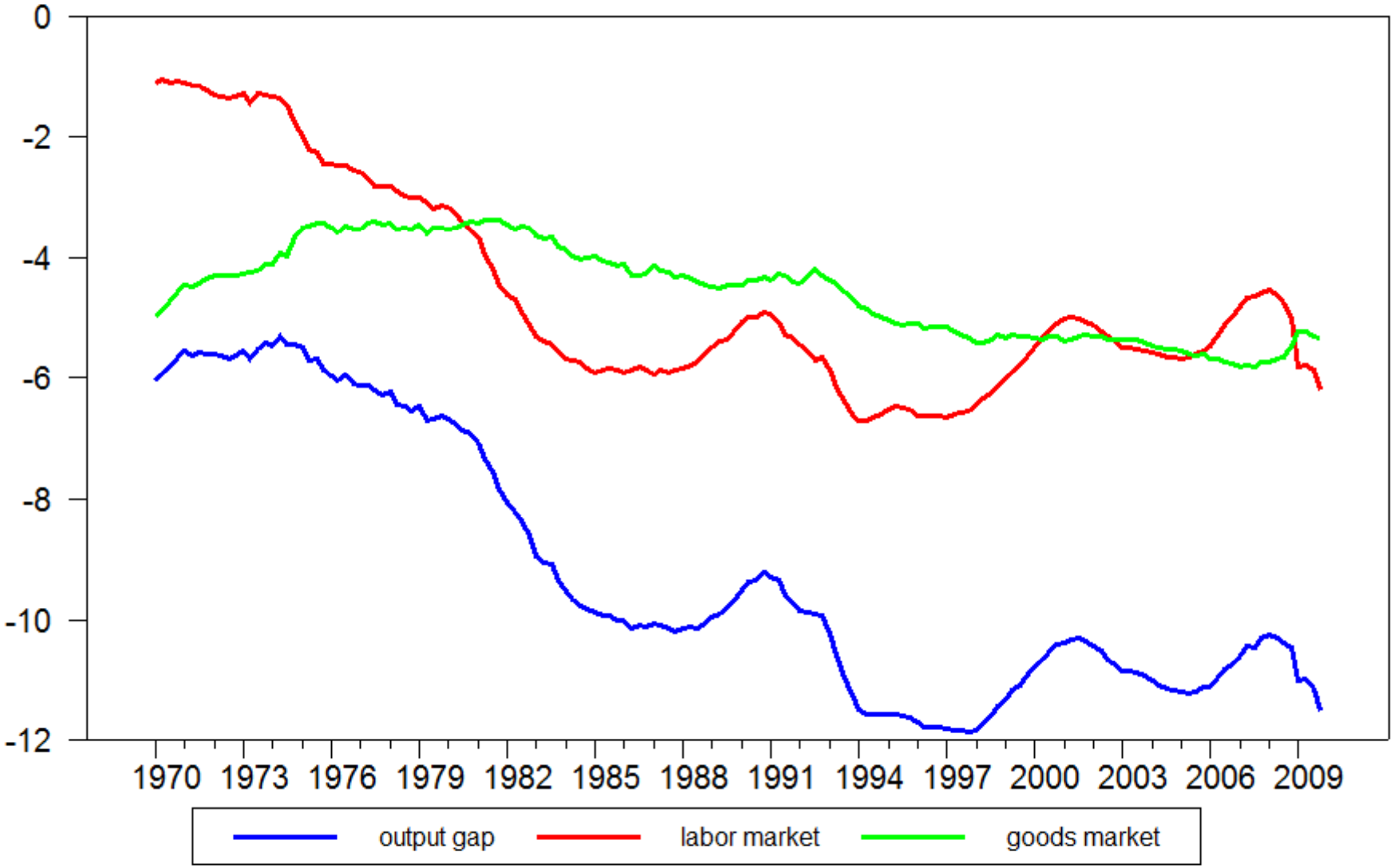
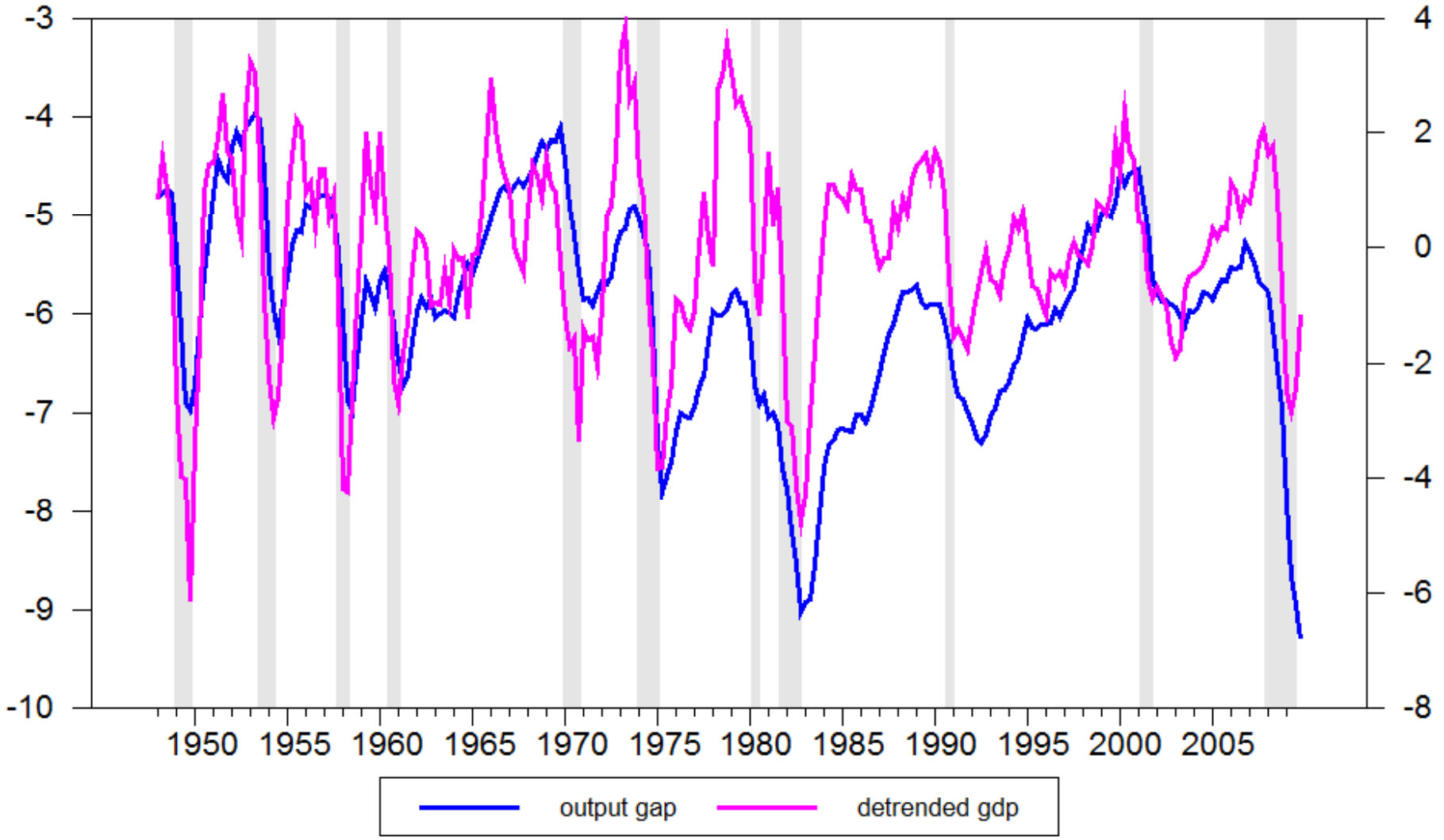


Figure 4a. The Output Gap and Detrended GDP in the U.S.



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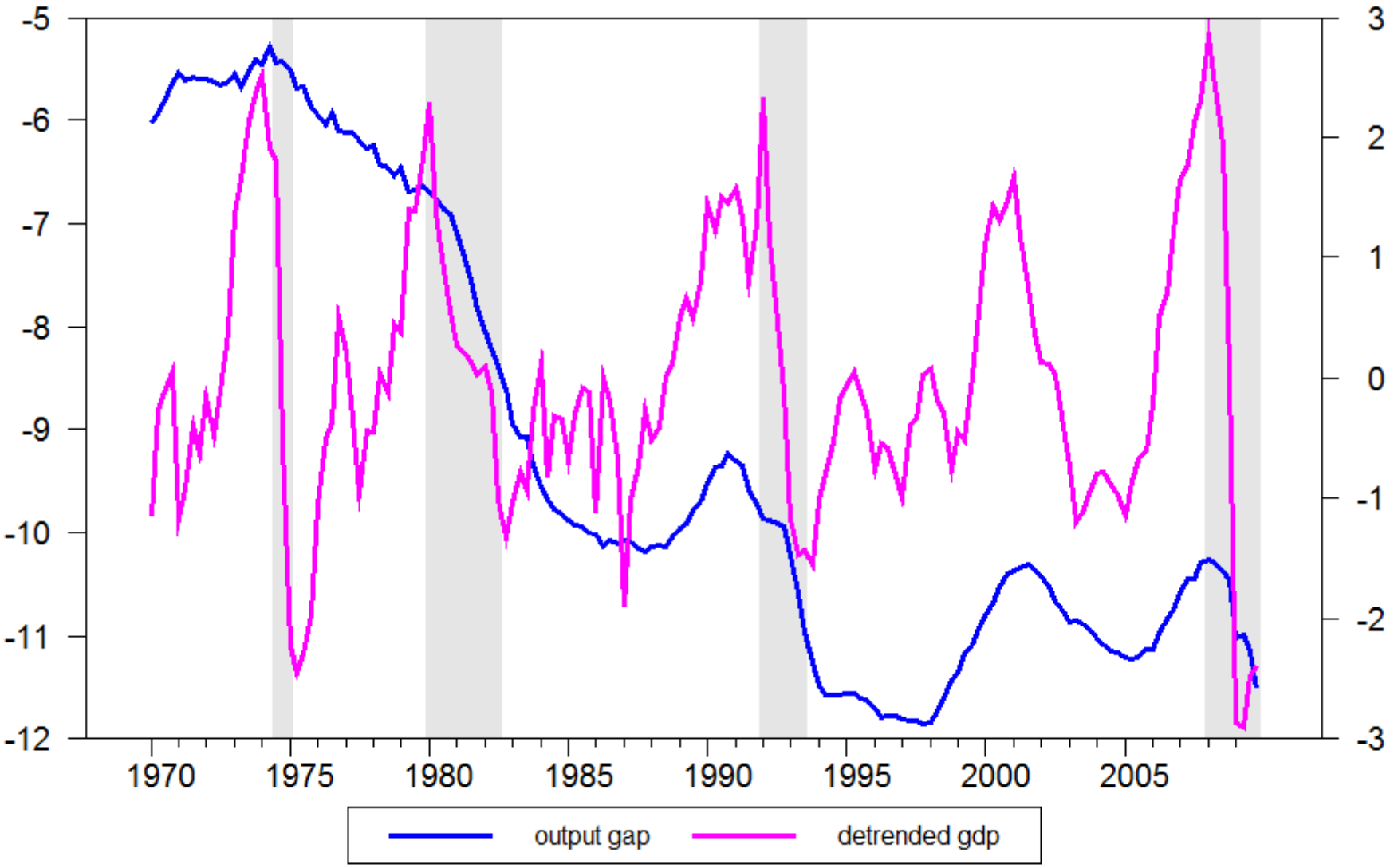


Figure 5a. The Output Gap in the U.S.: High α case

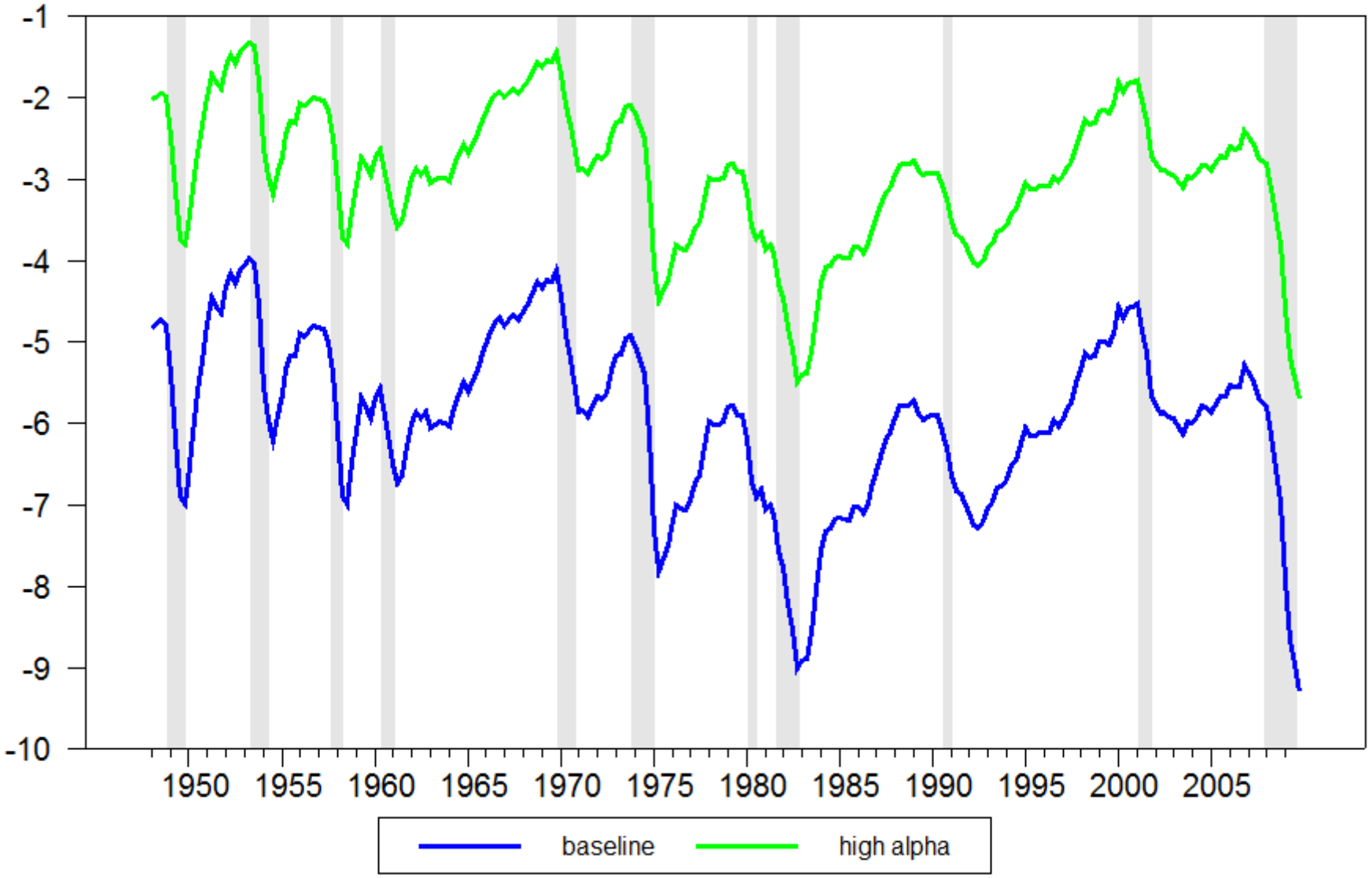
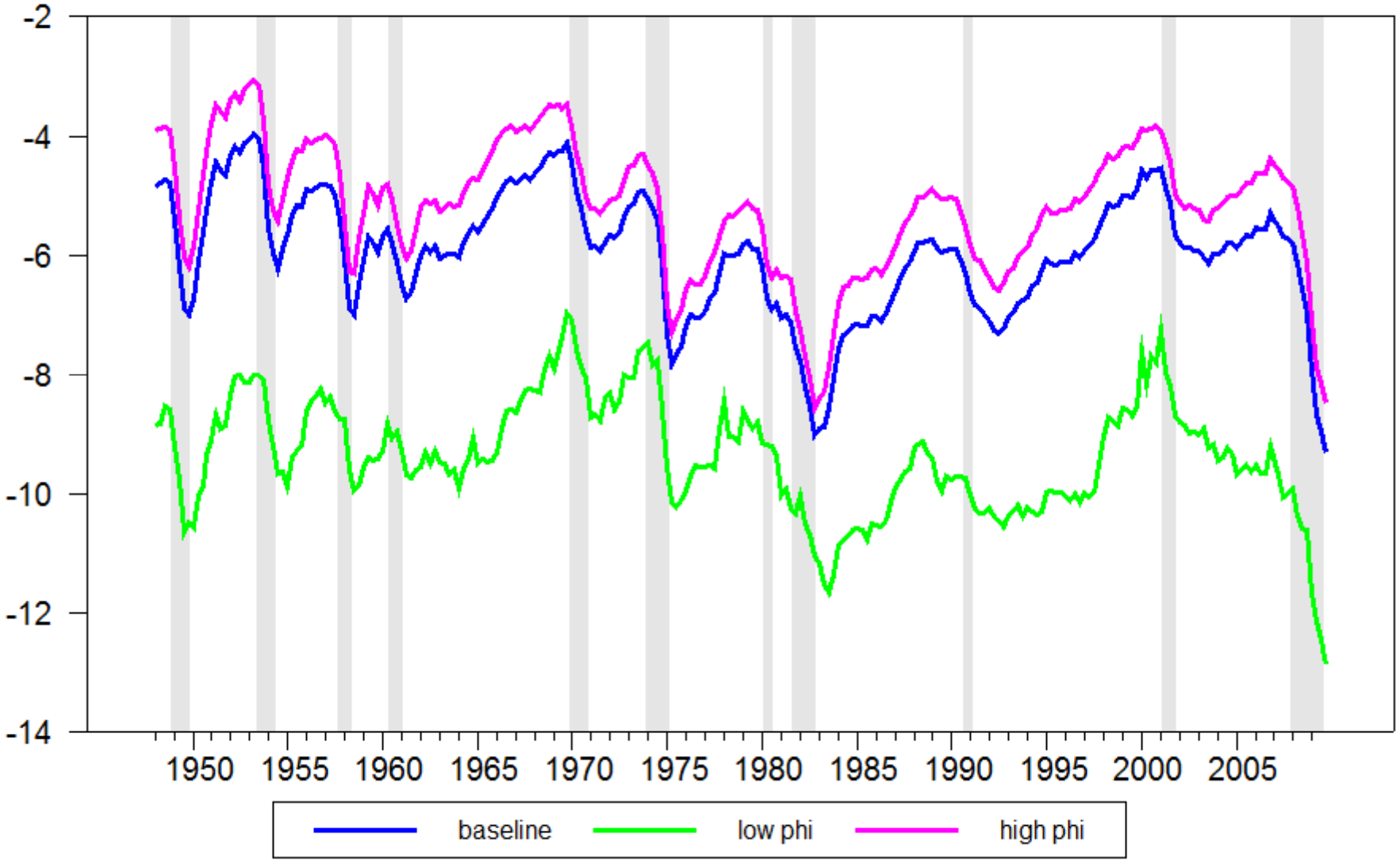


Figure 5a. The Output Gap in the U.S.: Alternative Frisch Elasticities



Output Gap Fluctuations and Welfare

- Utility losses caused by deviations from first-best:

$$\begin{aligned}
\mathcal{L}_t &\equiv U_t^e - U_t \\
&= \log(Y_t^e / Y_t) - \left(\frac{\chi_t}{1+\varphi}\right)\left((N_t^e)^{1+\varphi} - \int_0^1 N_t(i)^{1+\varphi} di\right) \\
&= \log(Y_t^e / Y_t) - \left(\frac{1-\alpha}{1+\varphi}\right)\left(1 - (N_t / N_t^e)^{1+\varphi}\right) \\
&= -x_t - \left(\frac{1-\alpha}{1+\varphi}\right)\left(1 - \exp\left\{\left(\frac{1+\varphi}{1-\alpha}\right) x_t\right\}\right) \equiv \mathcal{L}(x_t)
\end{aligned}$$

Caveat: I ignore dispersion-driven inefficiencies $\Rightarrow$ lower bound

- Evidence

Figure 6a. Utility Losses and the Output Gap

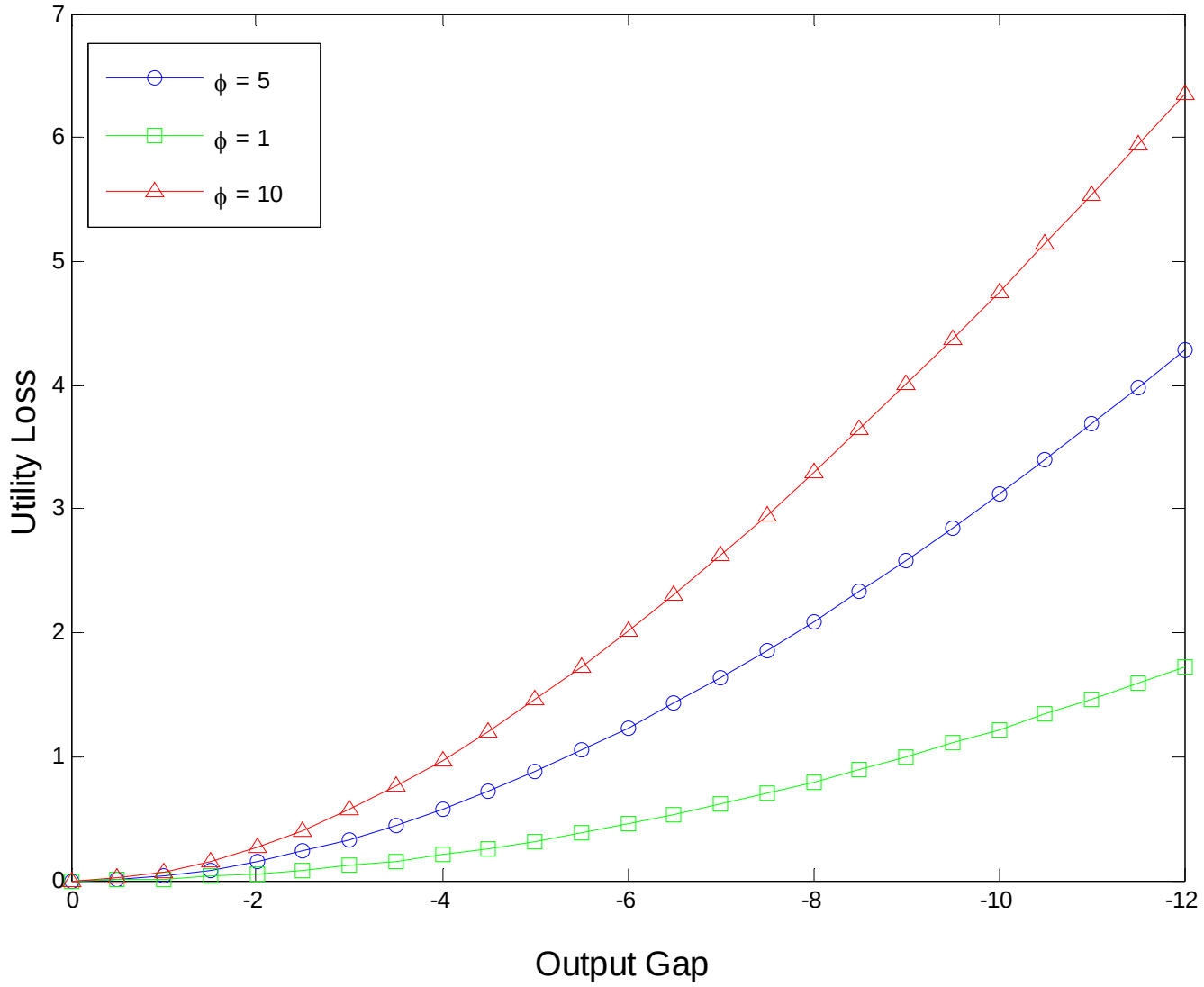


Figure 6b. Utility Losses and the Unemployment Rate

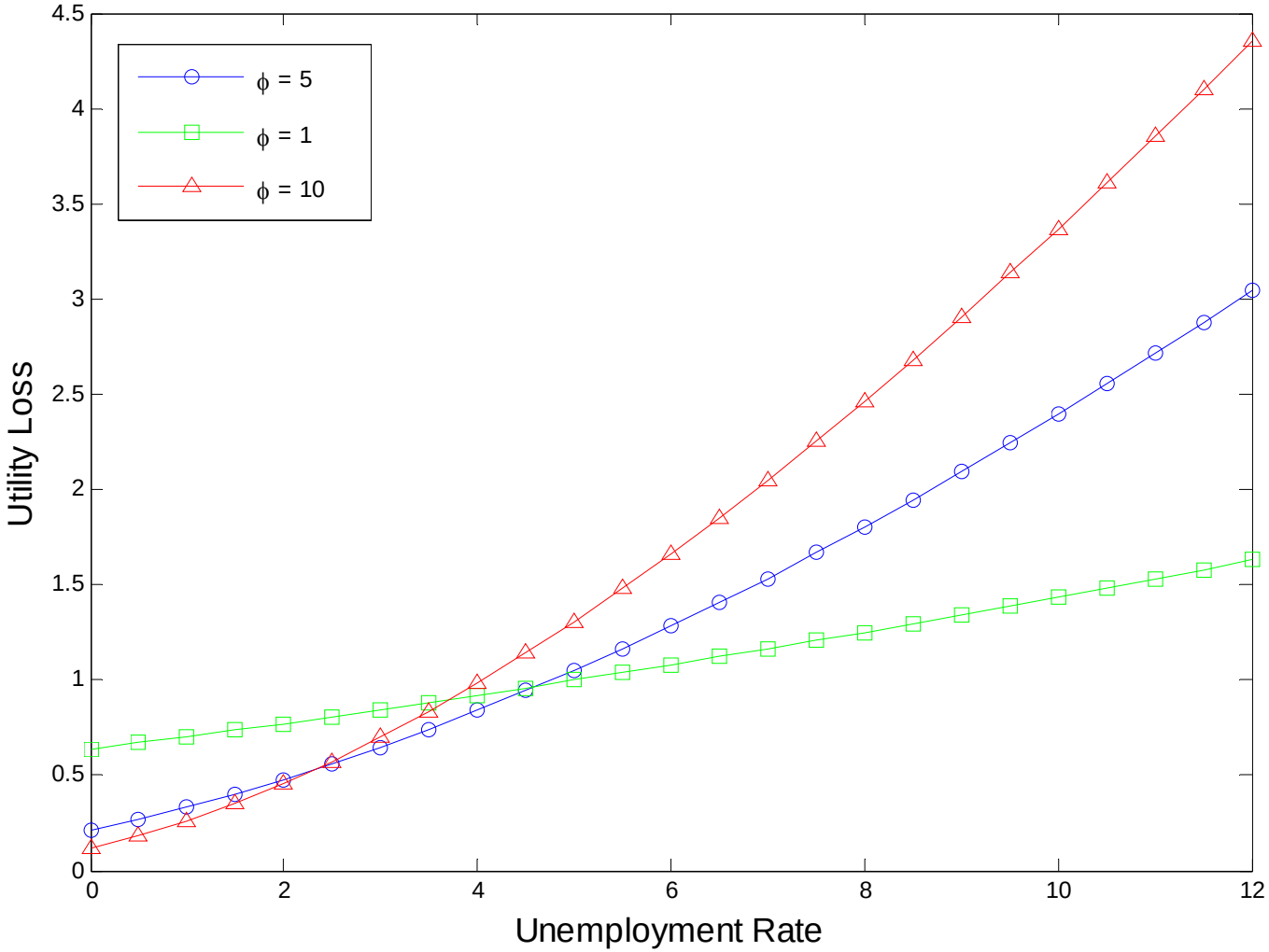


Figure 7a. Utility Losses in the U.S.

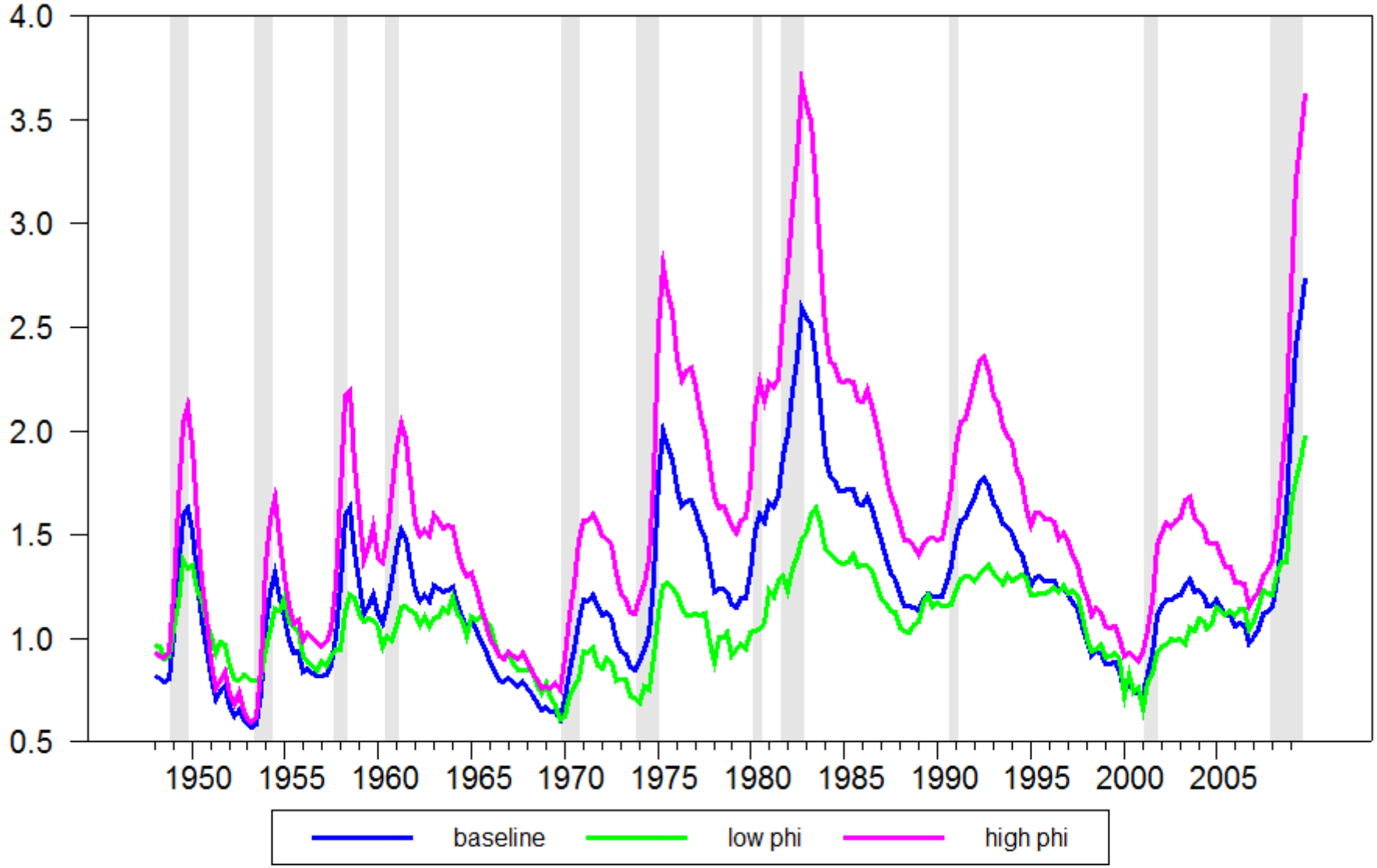


Figure 7b. Utility Losses in the Euro area

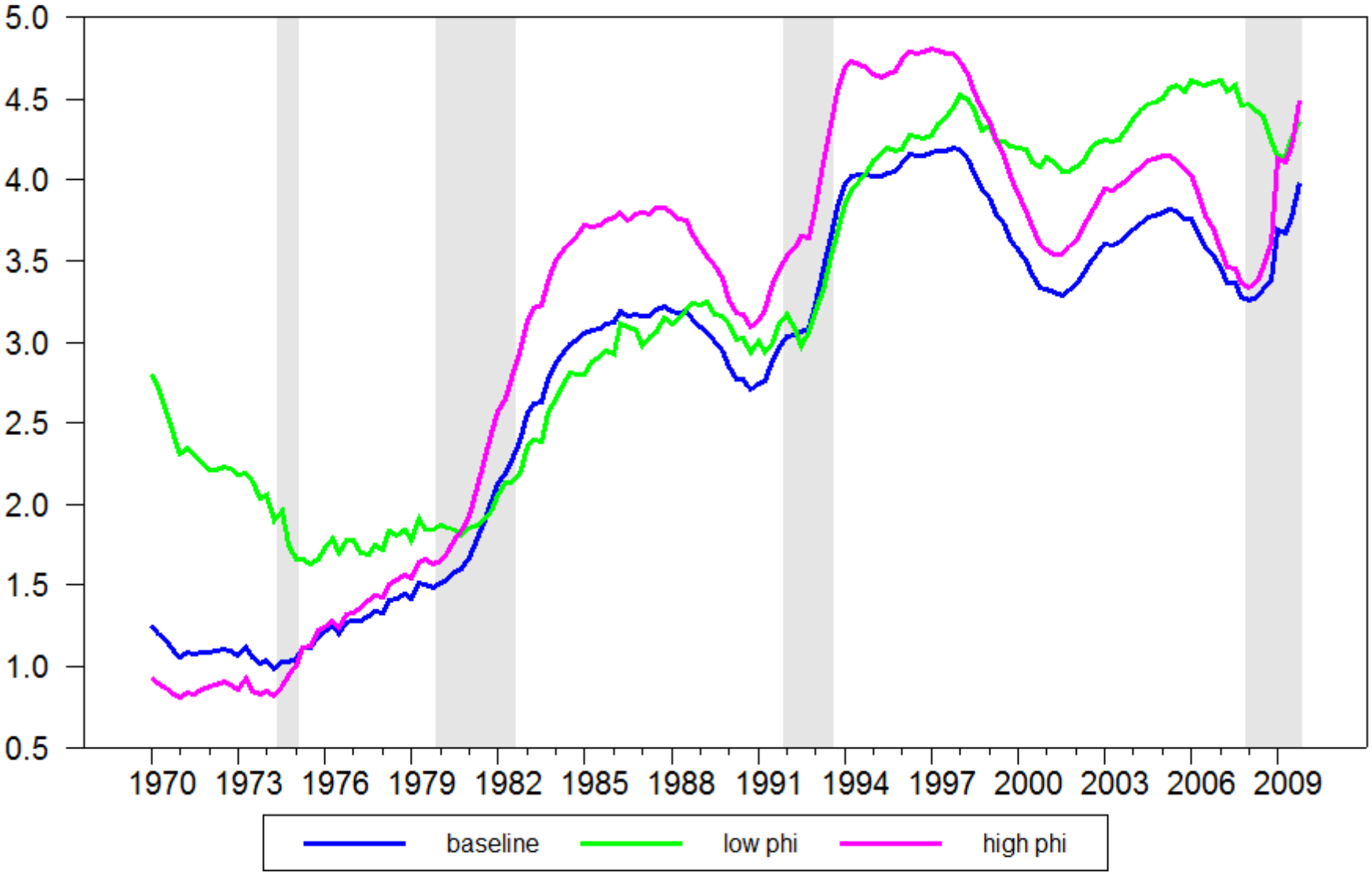


Table 4. Output Gap Fluctuations and Welfare						
	U.S.			*Euro area*		
	$\varphi = 5$	$\varphi = 10$	$\varphi = 1$	$\varphi = 5$	$\varphi = 10$	$\varphi = 1$
$E\{\mathcal{L}(x_t)\}$	1.23	1.58	1.08	2.76	3.08	3.19
$E\{\mathcal{L}(x_t)\} - \mathcal{L}(x)$	0.04	0.08	0.01	0.18	0.32	0.11
$E\{\mathcal{L}(x_t)\} - E\{\mathcal{L}(x_t \geq x)\}$	0.16	0.24	0.09	0.52	0.63	0.49
$E\{\mathcal{L}(x_t)\} - E\{\mathcal{L}(x_t + \Delta)\}$	0.22	0.34	0.08	0.31	0.43	0.13

Output Gap Fluctuations and Welfare

- Utility losses caused by deviations from first-best

$$\mathcal{L}(x_t) = -x_t - \left(\frac{1-\alpha}{1+\varphi}\right)\left(1 - \exp\left\{\left(\frac{1+\varphi}{1-\alpha}\right)x_t\right\}\right)$$

- Utility losses *from fluctuations* (about a given steady state):

$$E\{\mathcal{L}(x_t)\} - \mathcal{L}(x) \simeq \frac{1}{2}\left(\frac{1+\varphi}{1-\alpha}\right) var(x_t)$$

- Evidence

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Conclusions

- Large variations in the degree of efficiency of the economy, as measured by the output gap.

  - in the U.S.: closely related to business cycle.
  - in the Euro area: nonstationary component, beyond cyclical fluctuations.

- Substantial utility costs of an inefficient level of activity, especially in recessions.
- Average costs of inefficient fluctuations are small.
- Policy implications?
- Need to account for inflation-related distortions.