Welfare costs of business fluctuations
Gali, Gertler, López-Salido

theory-based measure of the variations in aggregate economic efficiency:

the gap between

- the marginal product of labor and
- households consumption/leisure tradeoff

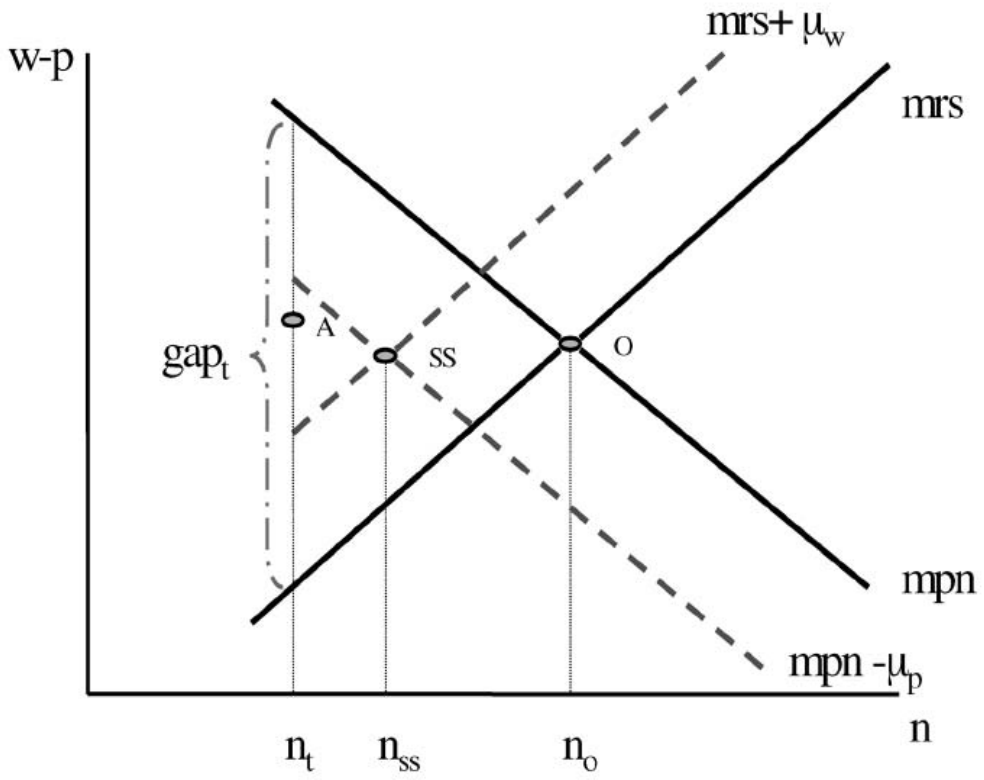
Use representative agent – no unemployment, only variation in hours.

Neglect costs of efficient fluctuations
Neglect costs of distortions of relative prices and wages (due to price and wage stickiness)

Lucas(1987, 2003)

- consider costs of variability in consumption, without taking source of fluctuation into account
- show that these costs are small

FIGURE 1.—THE GAP: A DIAGRAMMATIC EXPOSITION



Inefficiency gap

$gap_t = mrs_t - mpn_t$

Relate to markups in goods and labor markets wage-taking firms and no labor adjustment costs

Price markup

$\mu^p_t = p_t - (w_t - mpn_t)$

$= mpn_t - (w_t - p_t)$

Wage markup

$\mu^w_t = (w_t - p_t) - mrs_t$

(difference between wage and marginal disutility of work, expressed in terms of consumption)

$$U(C_t, N_t) = \frac{1}{1-\sigma} C_t^{1-\sigma} - \frac{1}{1+\varphi} N_t^{1+\varphi}$$

$$MRS_t = -\frac{U_{Nt}}{U_{Ct}}$$

Boom:

N and C are high => U_{Nt} high and U_{Ct} low

=> MRS_t high

Thus

$$gap_t = - \{ [mpn_t - (w_t - p_t)] + [(w_t - p_t) - mrs_t] \}$$

$$gap_t = - (\mu^p_t + \mu^w_t)$$

In steady state

$$gap = - (\mu^p + \mu^w) < 0$$

Measurement

Assume standard production function and utility function (constant elasticity of output with respect to hours) $Y = AN^{\alpha}$

$$mpn_t = y_t - n_t$$

$$mrs_t = \sigma c_t + \varphi n_t - \bar{\xi}_t$$

($\bar{\xi}_t$ reflect changes in preferences)

Thus:

$$gap_t = mrs_t - mpn_t = \sigma c_t + \varphi n_t - \bar{\xi}_t - (y_t - n_t)$$

$$\mu^p_t = p_t - (w_t - mpn_t) = (y_t - n_t) - (w_t - p_t) = -s_t$$

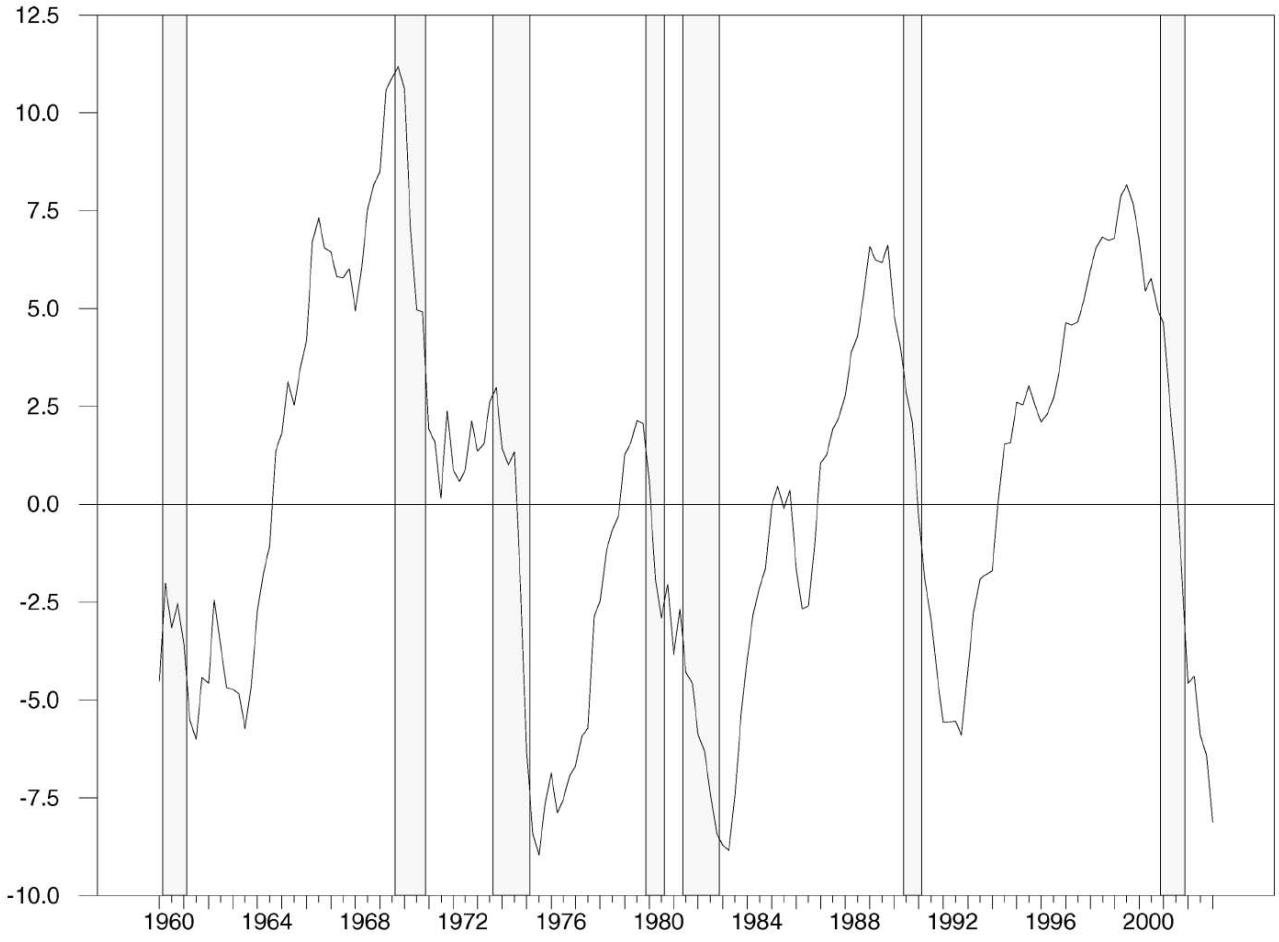
(s_t is wage share or log of real unit labor cost)

Baseline case: Assume

$\varphi = \sigma = 1$

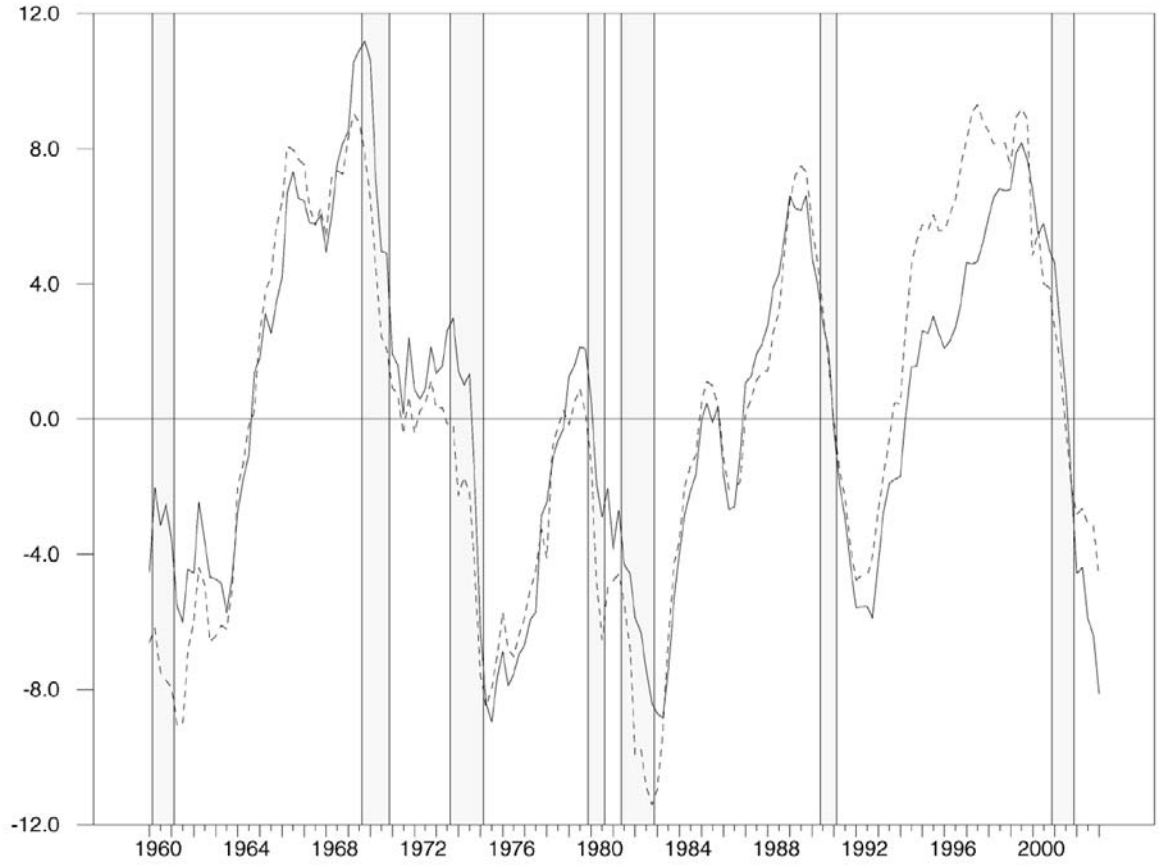
Low-frequency changes in preferences $\bar{\xi}_t$

FIGURE 2.—THE GAP: *BASELINE CALIBRATION* ($\sigma = 1$, $\varphi = 1$)



Changes in wage markup dominate variation in efficiency gap

FIGURE 3.—THE GAP AND THE WAGE MARKUP: *BASELINE CALIBRATION*



How to interpret?

Changes in preferences ?

No – show that one can reject test of no-Granger causality of detrended GDP, nominal interest rate and yield spread on gap measure (i.e. gap depends on these variables)

I.e. changes not caused by change in preferences

Furthermore, monetary policy shock also affects gap

Welfare costs

$$GAP = \frac{\overline{MRS_t}}{\overline{MPN_t}} = \exp\{-\mu\} \equiv 1 - \Phi < 1,$$

where upper bars denote values along a constant gap path, and μ is (minus) the steady-state value of our (log) gap variable. A second-order approximation of the period utility

$$\Delta_t \equiv U(C_t, N_t) - U(\bar{C}_t, \bar{N}_t)$$

$$= \bar{U}_{c,t}\bar{C}_t\left(\tilde{c}_t + \frac{1-\sigma}{2}\tilde{c}_t^2\right) + \bar{U}_{n,t}\bar{N}_t\left(\tilde{n}_t + \frac{1+\varphi}{2}\tilde{n}_t^2\right),$$

where the tildes denote log deviations from the underlying constant-gap path, that is, $\tilde{x}_t \equiv \log(X_t/\bar{X}_t)$, and where $\varphi \equiv -(\bar{U}_{nn,t}\bar{N}_t)/\bar{U}_{n,t}$ and $\sigma \equiv -\bar{U}_{cc,t}\bar{C}_t/\bar{U}_{c,t}$.

$$-\frac{\bar{U}_{n,t}\bar{N}_t}{\bar{U}_{c,t}\bar{C}_t} = 1 - \Phi.$$

Hence, we can rewrite the second-order approximation as

$$\Delta_t = \bar{U}_{c,t}\bar{C}_t\left(\Phi\tilde{y}_t - \frac{1}{2}[(\sigma + \varphi) - (1 - \Phi)(1 + \varphi)]\tilde{y}_t^2\right). \tag{19}$$

$$\widehat{gap}_t = (\sigma + \varphi)\tilde{y}_t,$$

where $\widehat{gap}_t \equiv gap_t - gap$. Using the previous expression to substitute for $\tilde{y}_t$ in equation (19), we obtain

$$\begin{aligned}\frac{\Delta_t}{\bar{U}_{c,t}\bar{C}_t} &= \frac{1}{\sigma + \varphi}(\Phi\widehat{gap}_t - \psi\widehat{gap}_t^2) \\ &\equiv \omega(\widehat{gap}_t)\end{aligned} \tag{20}$$

where $\psi \equiv \frac{1}{2}\left[1 - \frac{(1 - \Phi)(1 + \varphi)}{\sigma + \varphi}\right]$.

Notice that $\omega(\widehat{gap}_t)$ is the period efficiency loss or gain from the gap's deviations from its steady-state value, expressed as a percentage of the frictionless level of consumption $\bar{C}_t$. The first term in the parentheses, the linear term,

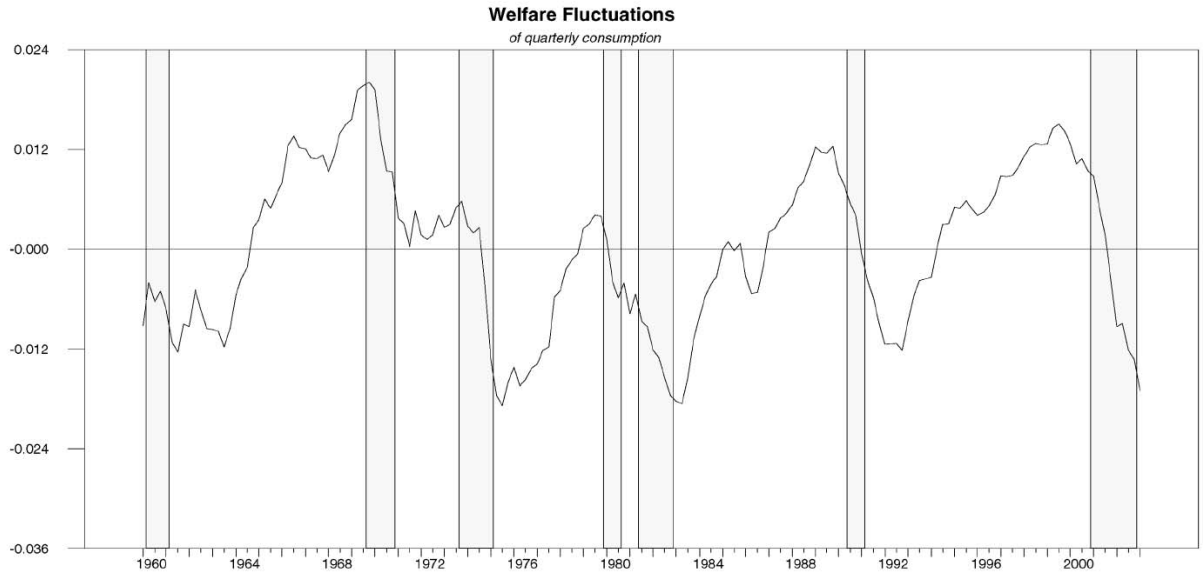
of the average welfare cost over time analogous to those found in the literature, we take the unconditional expectation of equation (20) to obtain

$$E\left\{\frac{\Delta_t}{\bar{U}_{c,t}\bar{C}_t}\right\} = -\frac{\psi}{\sigma + \varphi}\,\mathrm{var}(gap_t), \tag{21}$$

where $\mathrm{var}(gap_t)$ is the variance of our gap measure. Notice that, as a result of the concavity of ω, the expected welfare effects of fluctuations in the gap variable are negative, that is, these fluctuations imply *losses* in expected welfare. This

FIGURE 6.—THE WELFARE EFFECTS OF POSTWAR U.S. FLUCTUATIONS

(σ=1, φ=1, μ=0.50)



(σ=1, φ=5, μ=0.50)

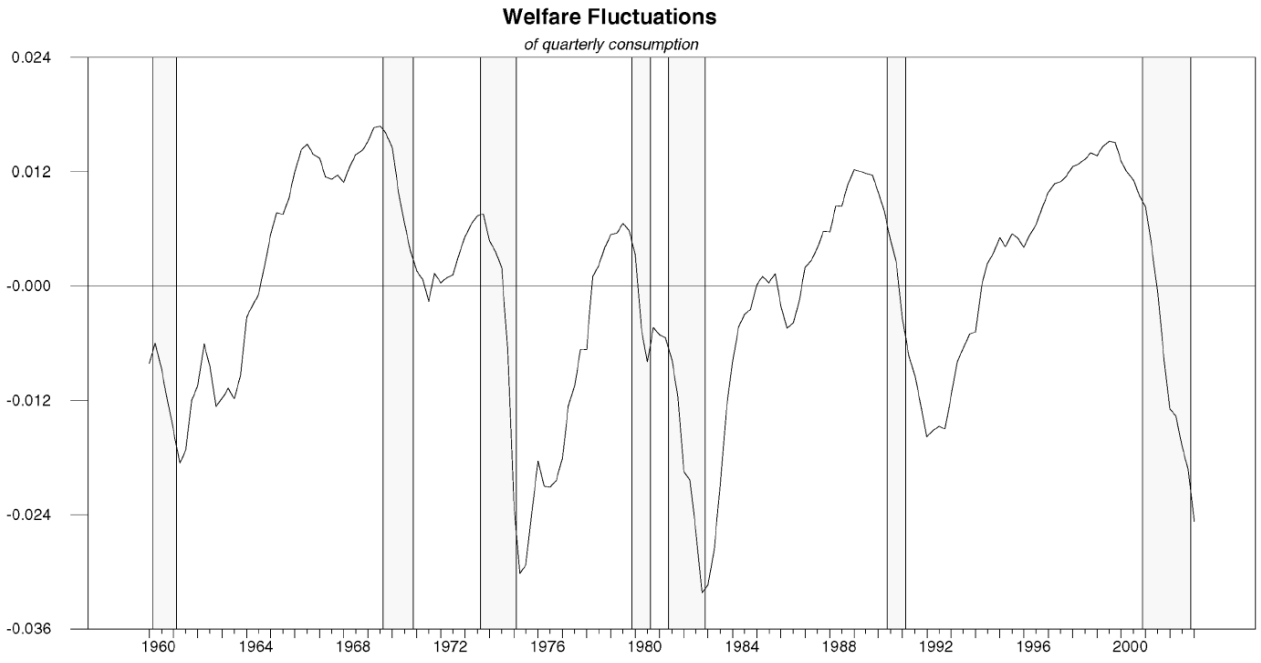


TABLE 4.—WELFARE COSTS OF FLUCTUATIONS (1960–2004)

	Percentage of One Year's Consumption	
σ	$\varphi = 1$	$\varphi = 5$
1	0.010	0.043
5	0.027	0.059
10	0.049	0.080

Note: Based on calibration $\mu = 0.5$. The data were filtered using a third-order polynomial in the time. Welfare computations cover the sample period 1960:1–2004:3.

TABLE 5.—THE WELFARE COSTS OF RECESSION EPISODES

		Percentage of One Year's Consumption		
σ	φ	1970s	1980s	1990s
1	1	−4.58	−4.69	−2.26
1	5	−6.18	−6.37	−3.22
5	1	−2.88	−7.23	−0.39
5	5	−4.89	−8.00	−1.65

Note: See table 4.

Discussion

- representative agent, no unemployment
- recession give increase utility of leisure
- neglect other costs of unemployment
  - self confidence,
  - loss of human capital
  - social costs, etc
- costs associated with wage and price fluctuations

- Assume that deviations are symmetric
- if downturns are more persistent , then the welfare loss would be much greater
- neglect hysteresis