What the Cyclical Response of Advertising Reveals about Markups and other Macroeconomic Wedges

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Theorem:

Let R be the ratio of advertising expenditure to the value of output. Let $-\epsilon$ be the residual elasticity of demand. Let m be an exogenous multiplicative shift in the profit margin. Then the elasticity of R with respect to m is $\epsilon - 1$, *which is a really big number*.

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Papers on variations in market power

- Bils (1987), Nekarda and Ramey (2010, 2011)
- Rotemberg and Woodford (1999)
- Bils and Kahn (2000)
- Chevalier and Scharfstein (1996)
- Edmond and Veldkamp (2009)

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Literature on advertising

- Dorfman and Steiner (1954)
- Bagwell, *Handbook of IO* (2007), 143 pages!

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Wedges

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Product-market wedge f raises the purchaser's price relative to the seller's price—for example, a sales tax

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Propositions

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and

$$\log \lambda = -\log m - \log f + \mu_\lambda,$$

where μ^R and μ^λ are constant and slow-moving influences apart from m and f.

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Solving for $\log m$ and $\log f$ yields

$$\log m = \frac{\log R - \log \lambda}{\epsilon} + \mu_m$$

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and

$$\log f = -\log \lambda - \frac{\log R - \log \lambda}{\epsilon} + \mu_f$$

Here μ_m and μ_f are constant and slow-moving influences derived in the obvious way from μ_R and μ_λ.

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Advertising is a capital stock

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$$\kappa_t = \frac{r + \delta}{1 + r}\, v_t.$$

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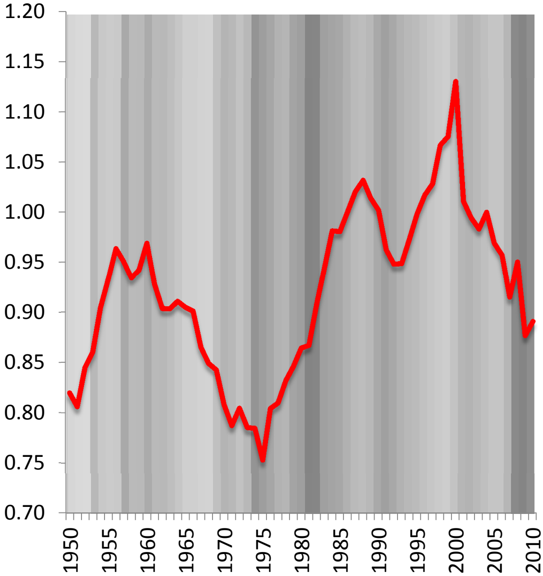
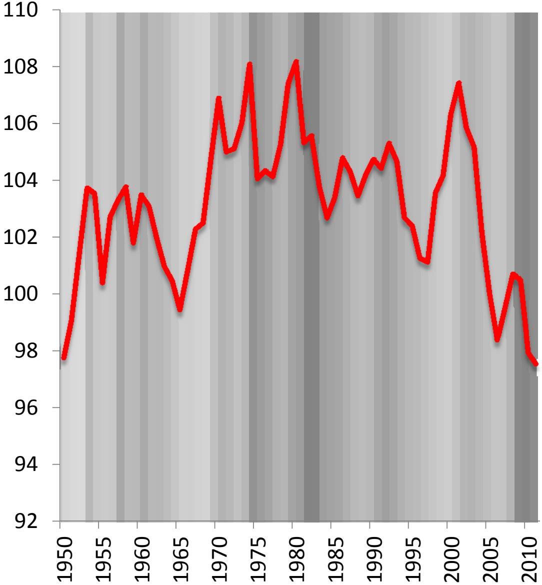
Advertising spending / private GDP



Labor share



110
108
106
104
102
100
98
96
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1950
1955
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1965
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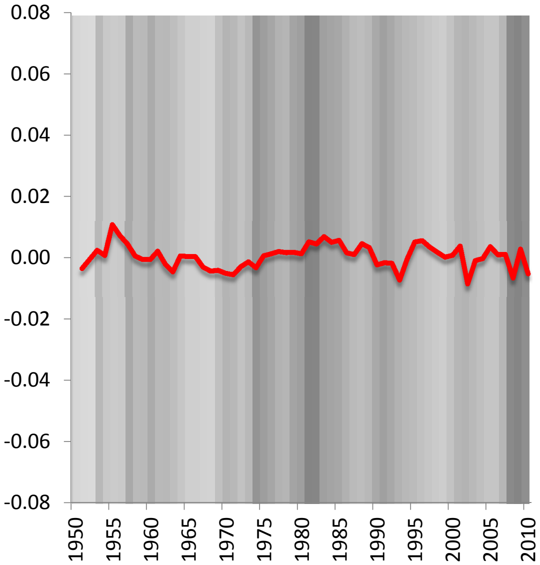
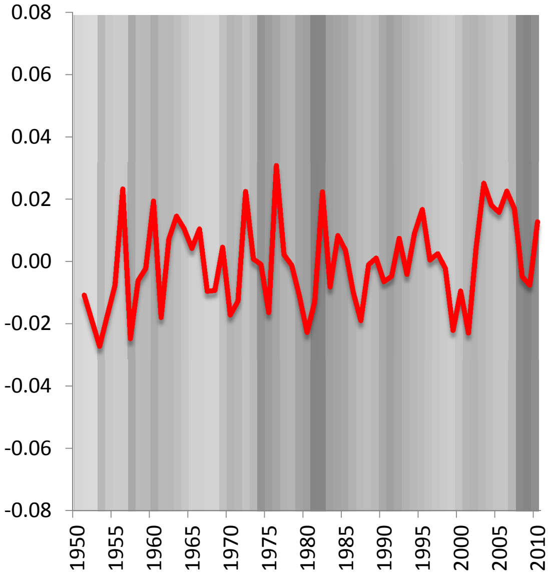
1975
1980
1985
1990
1995
2000
2005
2010

Profit-margin wedge



Product-market wedge



Periodicity

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Periodicity of a component at frequency ω is $2\pi/\omega$

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Filtering out higher periodcities

Baxter and King, 1999

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Linear filter $\phi(L)$

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Gain applied to a periodicity with frequency ω is $|\phi(e^{i\omega})|$

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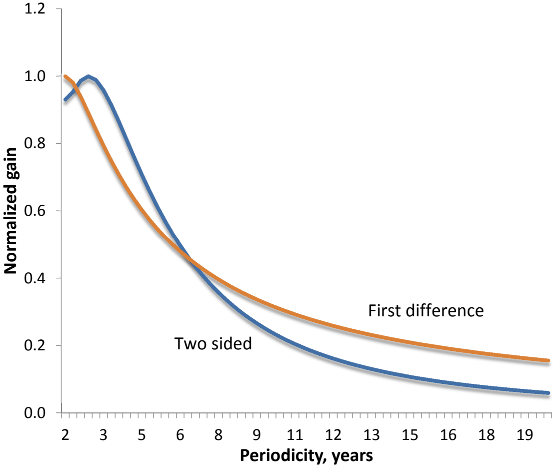
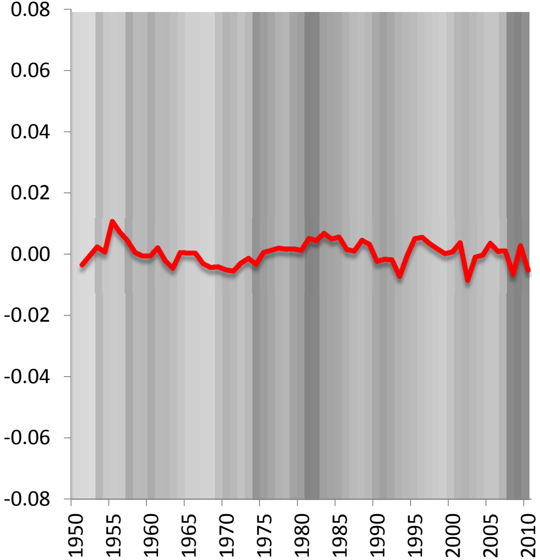
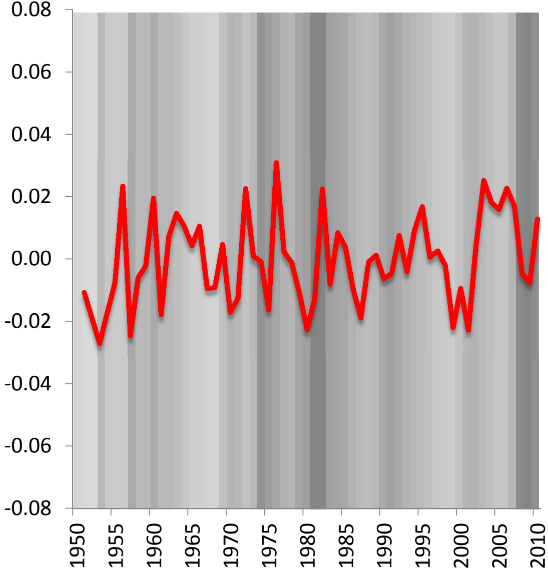
Gain functions for filters that emphasize cyclical movements



Calculated Filtered Time Series for the Profit-Margin Wedge



Calculated Filtered Time Series for the Product-Market Wedge



Regressions of the filtered markup wedge on the employment rate

Employment timing	*Filter*	*Coefficient*	*Standard error*	*Years*	*Upper-tail p-value for coefficient = -0.1*
Contemporaneous	First difference	0.02	(0.05)	1951-2010	0.004
	Symmetric	0.01	(0.04)	1952-2008	0.003
Lagged one year	First difference	0.00	(0.05)	1952-2010	0.014
	Symmetric	0.00	(0.04)	1953-2008	0.006

Regressions of the filtered product-market wedge on the employment rate

Employment timing	*Filter*	*Coefficient*	*Standard error*	*Years*	*Upper-tail p-value for coefficient = 0*
Contemporaneous	First difference	-0.09	(0.18)	1951-2010	0.298
	Symmetric	-0.06	(0.17)	1952-2008	0.368
Lagged one year	First difference	-0.84	(0.14)	1952-2010	0.000
	Symmetric	-0.82	(0.14)	1953-2008	0.000

Role of the two wedges in employment volatility

$$L_t = \theta \log m_t + \rho \log f_t + x_t$$

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From Hall, *JPE*, 2009, I take $\theta = -1$ as the main case, but examine the consequences of lower and higher values

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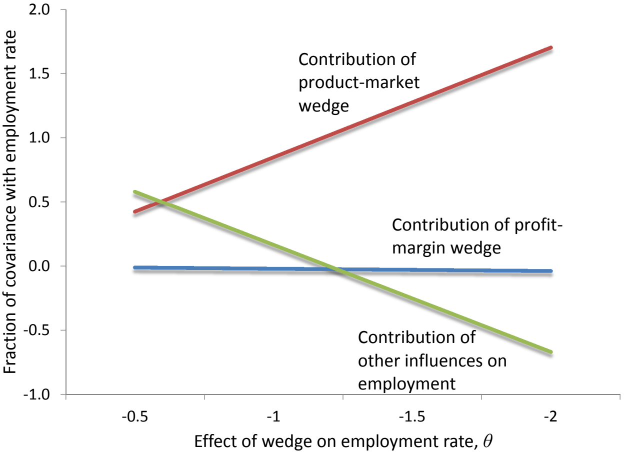
Contributions of Wedges to Employment Movements as Functions of the Parameter θ



Conclusions about the profit-margin wedge

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The evidence against a countercyclical profit-margin mechanism for cyclical movements of employment seems strong

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The product-market wedge is responsible for the fall in the advertising/GDP ratio R and for the decline in the labor share λ, in the aftermath of an employment contraction

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Other influences

- A Hicks-neutral productivity index, h
- A labor wedge or measurement error, f_L
- A capital wedge or measurement error, f_K
- An advertising wedge or measurement error, f_A

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Model with other influences

$$R = \frac{\kappa A}{pQ} = \frac{\alpha}{f_A\, f_Q\, m}\, \frac{(m-1)\epsilon + 1}{\epsilon}$$

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$$R = \frac{\kappa A}{pQ} = \frac{\alpha}{f_A \, f_Q \, m} \, \frac{(m-1)\epsilon + 1}{\epsilon}$$

$$\lambda = \frac{W}{pQ} = \frac{1}{f_L \, f_Q \, m} \, \gamma \, \frac{\epsilon - 1}{\epsilon}$$

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Conclusions

- The Hicks-neutral productivity index h and the capital wedge or measurement error f_K affect neither the advertising/sales ratio R nor the labor share λ.
- The new wedge f_A affects R with an elasticity of -1 and the new wedge f_L affects λ with an elasticity of -1; the margin wedge m remains the only wedge that has a high elasticity.
- The advertising wedge or measurement error, f_A, lowers R in the same way that f_Q does.
- The labor wedge or measurement error, f_L, lowers λ in the same way that f_Q does.
- Equal values of f_A and f_L have the same effect as f_Q of the same value.

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$$L_t = -\theta \log m_t - \delta \log f_t + x_t$$

Prior: $\theta = \delta = 1$

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Optimal price

$$\max_{p,A} \left(\frac{p}{f} - c\right) p^{-\epsilon}\, \bar{p}^{\,\bar{\epsilon}} A^{\alpha} \bar{A}^{\,-\bar{\alpha}} - \kappa A$$

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$$p^{*} = \frac{\epsilon}{\epsilon - 1}\, f\, c$$

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Profit-margin shock

$$p = m\, p^*$$

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Optimal advertising

$$\frac{\alpha}{A} Q \left(\frac{p}{f} - c \right) = \kappa$$

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$$\frac{\alpha}{A}\,Q\,\left(\frac{p}{f}-c\right)=\kappa$$

$$\frac{\kappa A}{pQ}=\alpha\frac{p/f-c}{p}$$

$$R=\frac{\kappa A}{pQ}=\alpha\frac{(m-1)\epsilon+1}{f\;m\;\epsilon}$$

Optimal advertising

$$\frac{\alpha}{A}\, Q\, \left(\frac{p}{f} - c\right) = \kappa$$

$$\frac{\kappa A}{pQ} = \alpha \frac{p/f - c}{p}$$

$$R = \frac{\kappa A}{pQ} = \alpha \frac{(m-1)\epsilon + 1}{f\ m\ \epsilon}$$

$$\text{With } f = m = 1,\ R = \frac{\alpha}{\epsilon}$$

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Labor share

$$\lambda = \frac{W}{pQ}$$

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$$\lambda = \frac{\gamma \; c \; Q}{pQ} = \gamma \frac{\epsilon - 1}{\epsilon} \frac{1}{f \; m}$$

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Implications of Alternative Values of the Residual Elasticity of Demand, with $\theta = -1$

Employment timing	*Filter*	*Implied contributions of wedges to cyclical movements in the employment rate*					
		ε, residual elasticity of demand					
		3		6		12	
		$\theta\beta_m$	$\theta\beta_f$	$\theta\beta_m$	$\theta\beta_f$	$\theta\beta_m$	$\theta\beta_f$
Contemporaneous	First difference	-0.05 (0.09)	0.12 (0.18)	-0.02 (0.05)	0.09 (0.18)	-0.01 (0.02)	0.08 (0.18)
	Symmetric	-0.02 (0.08)	0.07 (0.17)	-0.01 (0.04)	0.06 (0.17)	0.00 (0.02)	0.05 (0.18)
Lagged one year	First difference	-0.01 (0.09)	0.84 (0.15)	0.00 (0.05)	0.84 (0.14)	0.00 (0.02)	0.83 (0.14)
	Symmetric	0.00 (0.08)	0.82 (0.14)	0.00 (0.04)	0.82 (0.14)	0.00 (0.02)	0.82 (0.14)

Implications of Alternative Values of the Depreciation Rate

Employment timing	*Filter*	*Implied contributions of wedges to cyclical movements in the employment rate*					
		δ, annual rate of depreciation					
		1		0.6		0.3	
		$\theta\beta_m$	$\theta\beta_f$	$\theta\beta_m$	$\theta\beta_f$	$\theta\beta_m$	$\theta\beta_f$
Contempo-raneous	First difference	-0.15 (0.07)	0.22 (0.17)	-0.02 (0.05)	0.09 (0.18)	0.11 (0.04)	-0.04 (0.18)
	Symmetric	-0.16 (0.06)	0.21 (0.17)	-0.01 (0.04)	0.06 (0.17)	0.14 (0.03)	-0.09 (0.17)
Lagged one year	First difference	0.14 (0.07)	0.69 (0.15)	0.00 (0.05)	0.84 (0.14)	-0.02 (0.04)	0.85 (0.14)
	Symmetric	0.17 (0.06)	0.65 (0.15)	0.00 (0.04)	0.82 (0.14)	-0.03 (0.04)	0.86 (0.14)

Covariance decomposition

$$V(L_t) = \theta \operatorname{Cov}(m_t, L_t) + \theta \operatorname{Cov}(f_t, L_t) + \operatorname{Cov}(x_t, L_t)$$

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$$\mathrm{V}(L_t) = \theta\,\mathrm{Cov}(m_t, L_t) + \theta\,\mathrm{Cov}(f_t, L_t) + \mathrm{Cov}(x_t, L_t)$$

$$1 = \theta\,\frac{\mathrm{Cov}(m_t, L_t)}{\mathrm{V}(L_t)} + \theta\,\frac{\mathrm{Cov}(f_t, L_t)}{\mathrm{V}(L_t)} + \frac{\mathrm{Cov}(x_t, L_t)}{\mathrm{V}(L_t)}.$$

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$$1 = \theta\beta_m + \theta\beta_f + \beta_x$$

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