Simulating an Employment Guarantee Policy in the U. S.

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Employment Guarantee Policies: Theory and Practice
Jerome Levy Economics Institute, Bard College
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- **General Purpose:**
  Quantitative modeling/simulation of
  Employment Guarantee Policy
  using the Fairmodel (Fair 1984, 1994, 2004)

- Within historical business cycles, 1985-2005
  Macroeconomic and budgetary impacts

- Using stochastic simulation (Fair 2004, 2005)
  Stabilization properties of Employment Guarantee Policy compared with those of:
  - Interest rate rule (Fair 2001)
  - Indirect business tax rate rule (Fair 2005)
  - Asymmetric income transfer rule (Seidman/Lewis 2002)

The Fairmodel

- 130 Equations
  30 Stochastic equations (2SLS)
  100 Identities

- 6 Sectors

Households	Firms	Financial/Banks
Foreign	Fed Govt	State and Local

- Post WWII US Data (1952-2006)

- Complete integration of NIPA and Flow of Funds

The Fairmodel

From Fair 2004:

- Individual stochastic equations pass numerous econometric tests and are structurally stable across many business cycles and regime changes
- Fairmodel "dominates" VAR and AR components models in out-of-sample forecasts
- Predicted stock market bubble in late 1990s; all other equations remained structurally stable (rejected "new economy")

The Fairmodel

- Expectations are important, but not REH
- Nominal rates, rather than real rates, matter
- Production driven by expected sales and inventories; employment driven by production
- Capital adjusted to meet expected production, sales; saving does not fund investment
- Monetary policy tool is short-term interest rate; estimated reaction function

The Fairmodel

- Fair's empirical research rejects NAIRU dynamics
- Inflation dynamics consistent with markup view and horizontal region of Phillips curve; unemployment rate affects price *level*
- Long-term interest rates not set in loanable funds market; expectations theory with liquidity and risk premiums
- Stock flow consistency. Fairmodel is "one of the outstanding individual contributions to SFC approach" (Lavoie and Godley)

The Fairmodel and the Lucas Critique

- Empirical significance of Lucas Critique has been questioned by many.
- Fair (1994) argues that models that suffer from Lucas Critique in important ways can be weeded out through rigorous testing.
- Fair (2006) shows that Fairmodel's real GDP and GDP deflator forecasts dominate forecasts from RBC (Ireland 2004) and NK (Del Negro et al. 2006) models in terms of RMSE.

Employment Guarantee in the Fairmodel

- Simulation period is 1985:1 to 2005:3
- Wage (WELR) set at $3.81 in 1985
    - Grows at 2.5% per year
    - $6.25 in 2005
- EG Employees (JELR) set equal to all measured unemployed (U)
- EG program phased in during 1985-1987

Employment Guarantee in the Fairmodel

- Hours worked (HELR) = 34 hours per week/worker
- Total income of EG employees

$$YELR = WELR \times JELR \times HELR$$

- Non-labor or other costs of EG program

$$COSTELR = 15\% \text{ of } YELR$$

- Total spending on EG program

$$ELRSPEND = YELR + COSTELR$$

Employment Guarantee in the Fairmodel

- EG equations or variables incorporated into several NIPA and Flow of Funds identities related to income, spending, sales
- Time trend in private sector wage equation replaced with real GDP to account for rise in production due to EG incomes and spending.
- At least 33% of annual rise in WELR and initial rise above minimum wage passed through to average private sector wages.

Table 1: Base Data for 1985:1-2005:3

Year	*Real GDP Growth*	*Unemployment Rate*	*Inflation Rate*
1985	4.13%	7.21%	2.97%
1986	3.47%	7.01%	2.33%
1987	3.38%	6.20%	2.39%
1988	4.13%	5.51%	4.56%
1989	3.54%	5.28%	3.36%
1990	1.88%	5.61%	3.92%
1991	-0.17%	6.84%	2.17%
1992	3.33%	7.50%	2.42%
1993	2.67%	6.91%	2.03%
1994	4.02%	6.09%	2.32%
1995	2.50%	5.60%	2.17%
1996	3.70%	5.40%	1.98%
1997	4.50%	4.93%	1.76%
1998	4.18%	4.50%	1.28%
1999	4.45%	4.21%	1.74%
2000	3.66%	3.99%	2.17%
2001	0.75%	4.75%	2.22%
2002	1.60%	5.79%	1.39%
2003	2.70%	5.99%	1.29%
2004	4.21%	5.52%	2.87%
2005	3.15%	5.13%	3.07%

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Figure 2: Simulated ELR Employees

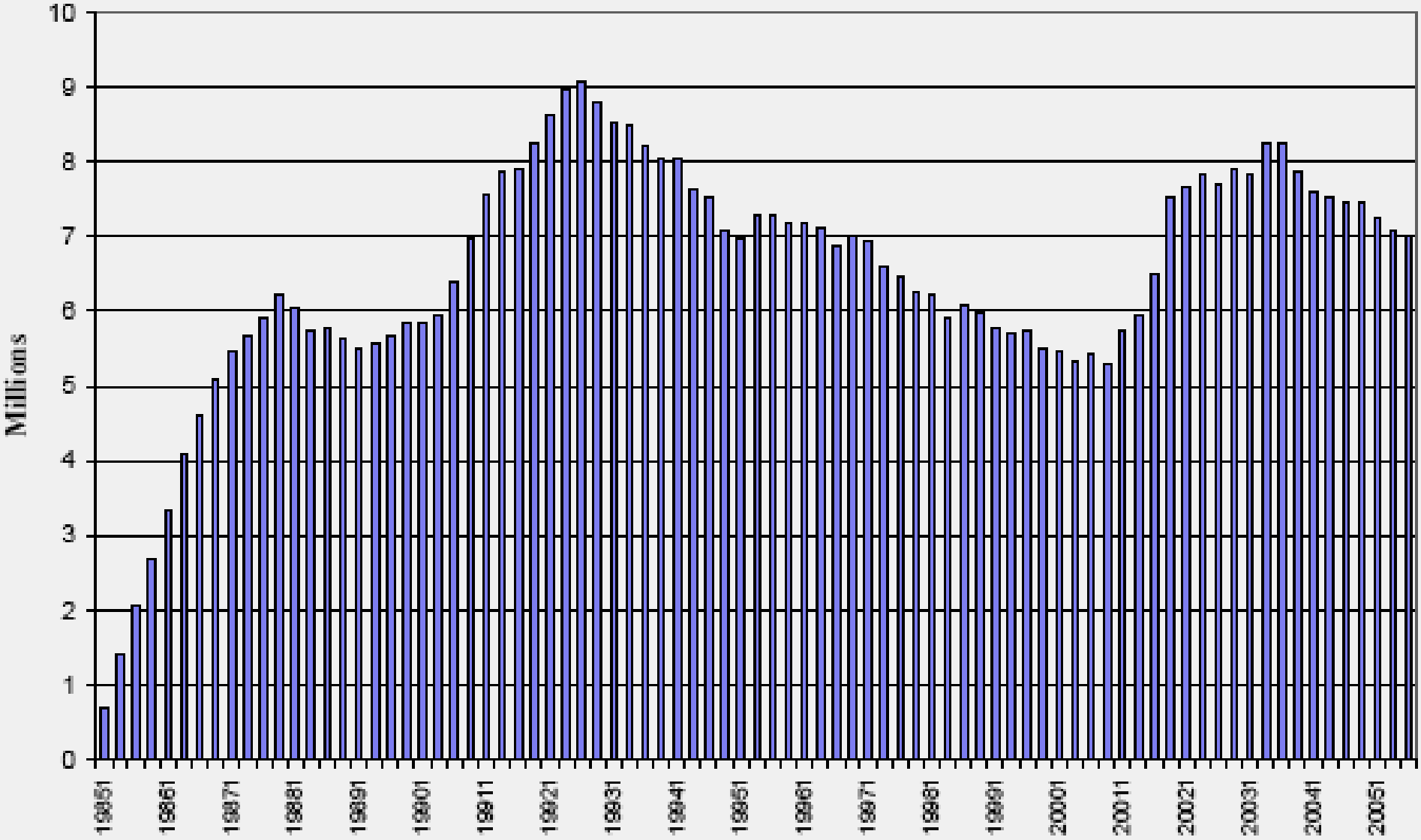

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Figure 3: Base Real GDP (squares) and Real GDP from ELR Simulation (diamonds)

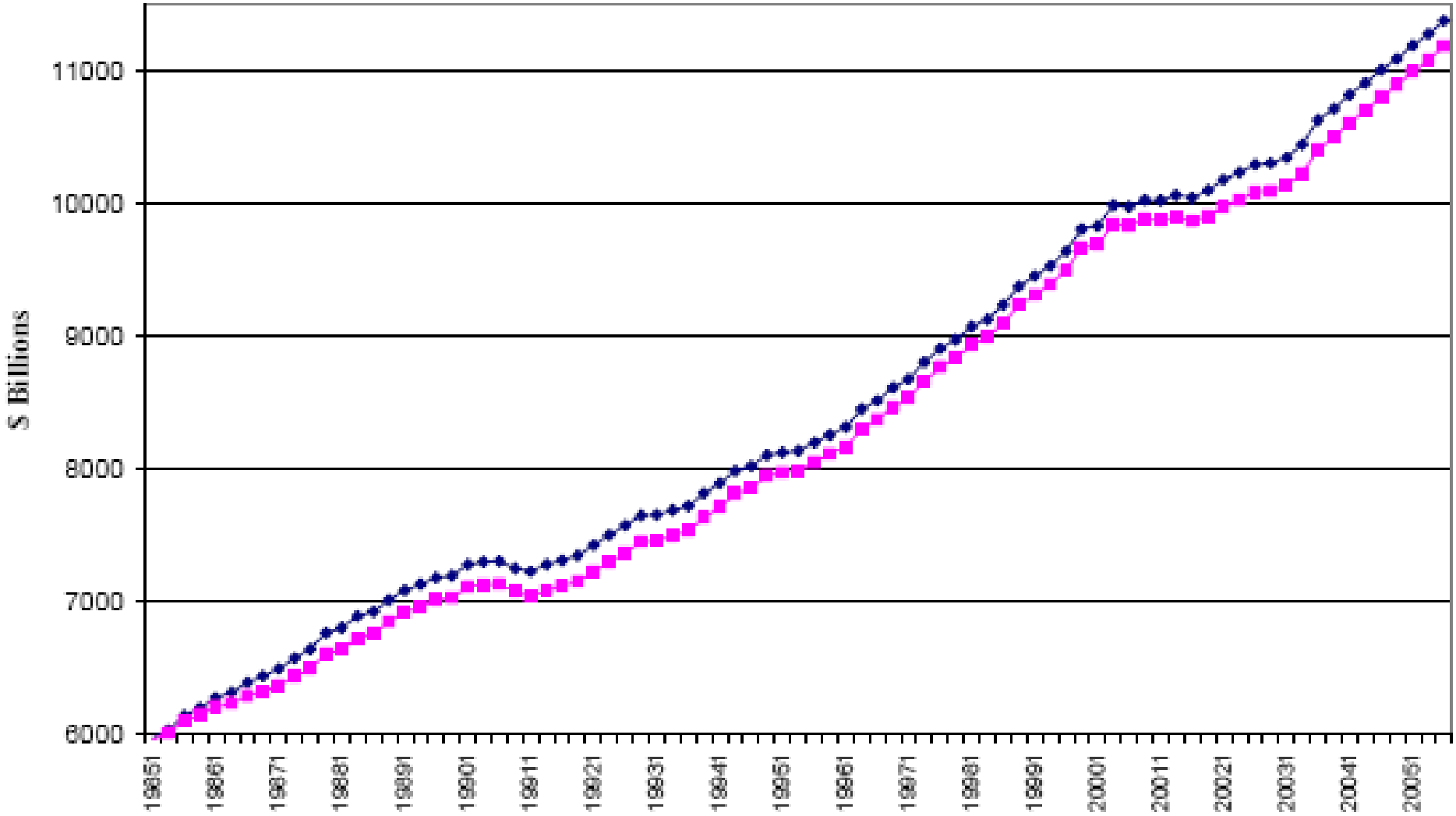

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Figure 4: Real GDP in ELR Simulation Less Base Value

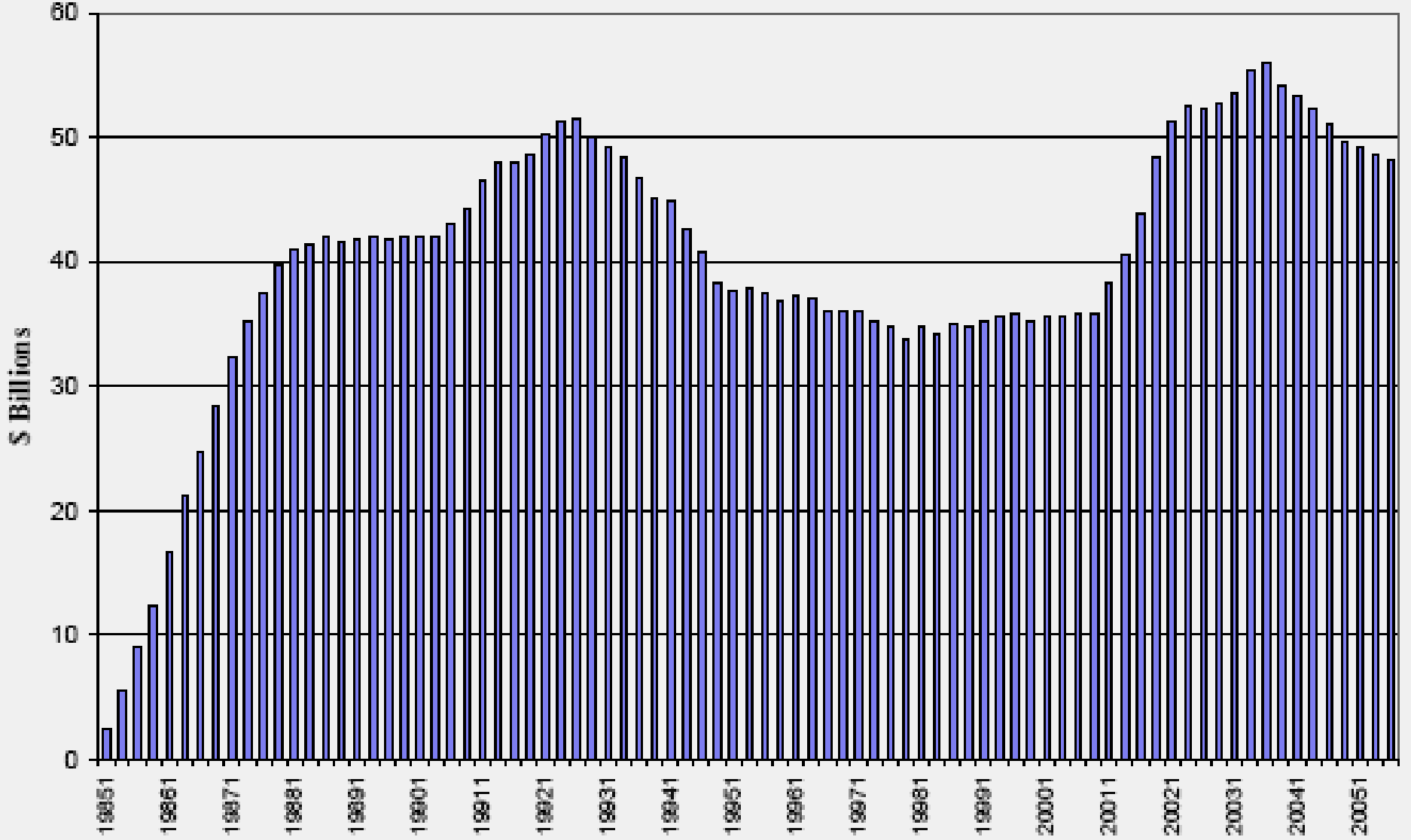


Figure 5: Unemployment Rate in ELR Simulation Less Base Value

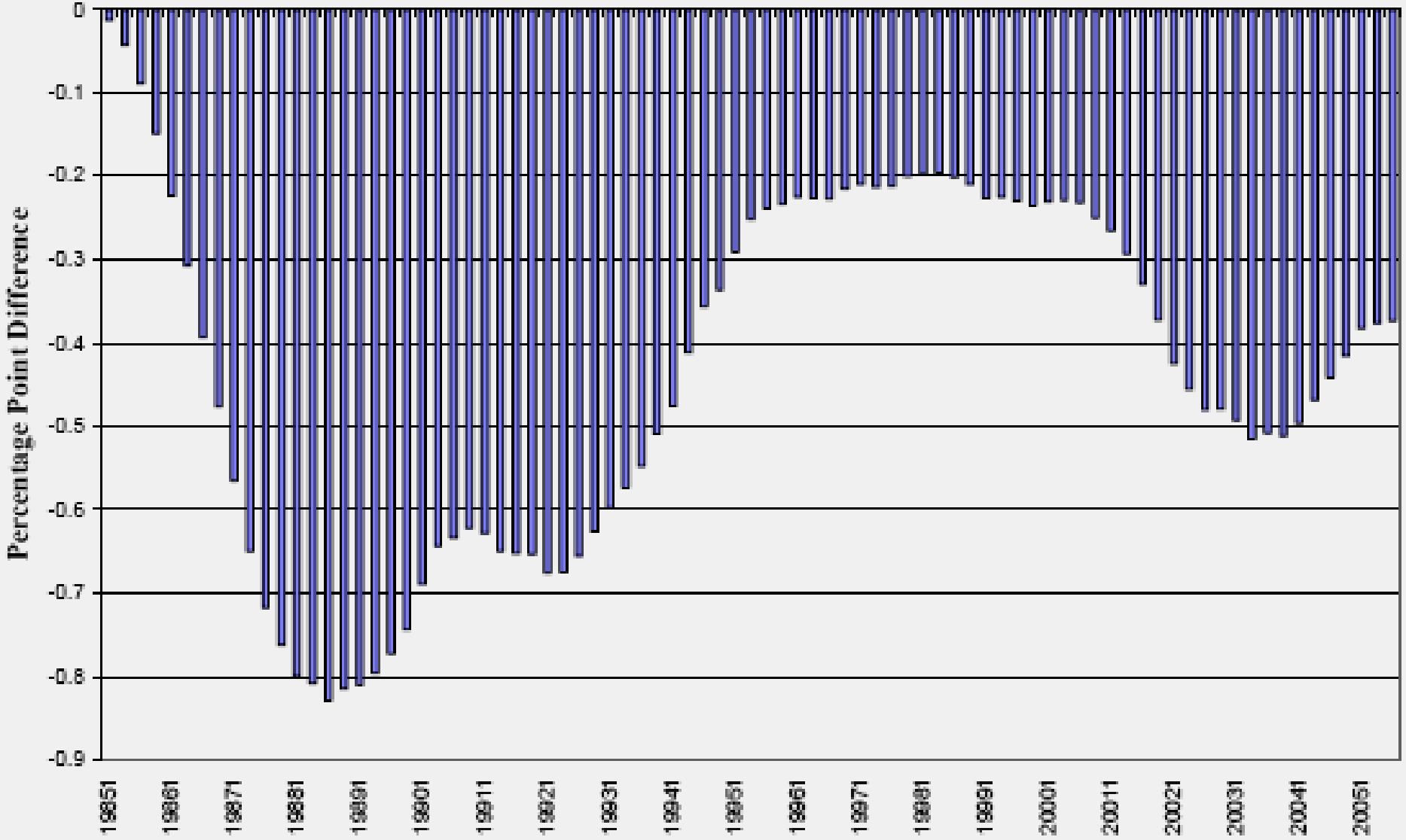


Figure 6: Private Sector Jobs in ELR Simulation Less Base Value

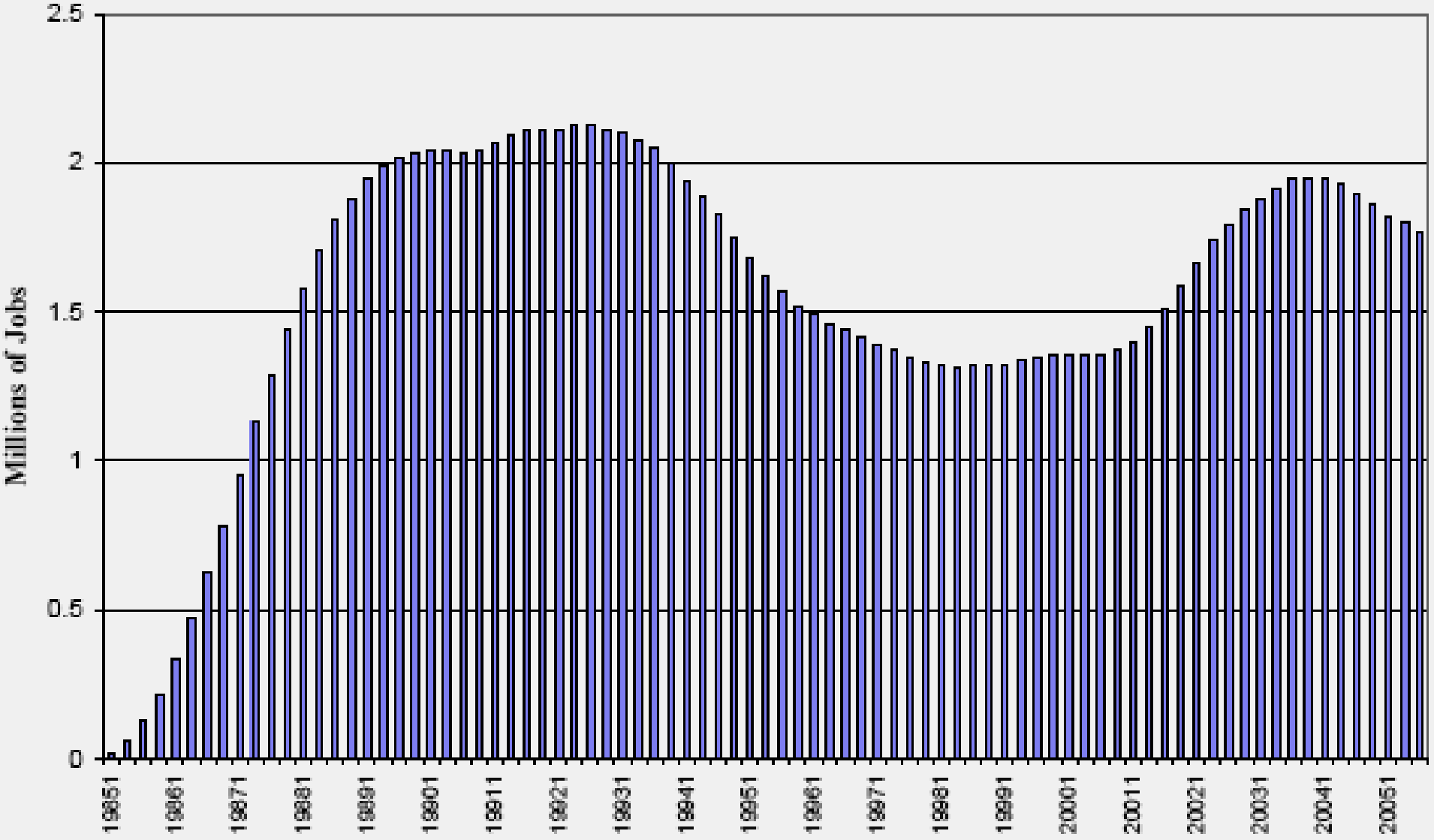


Figure 7: Year-to-Year Inflation in ELR Simulation Less Base Value

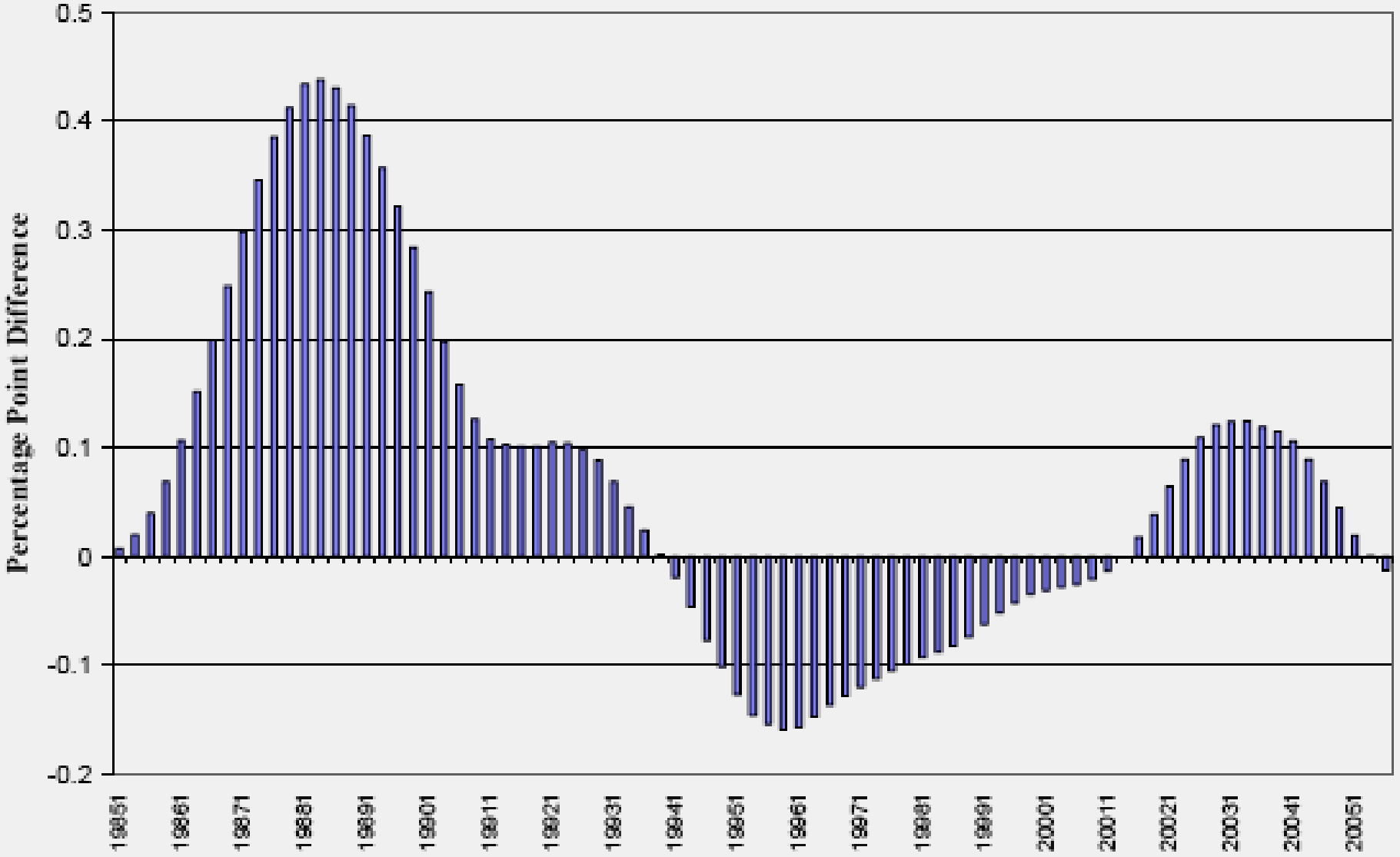


Figure 8: Total ELR Program Spending as a Percent of GDP

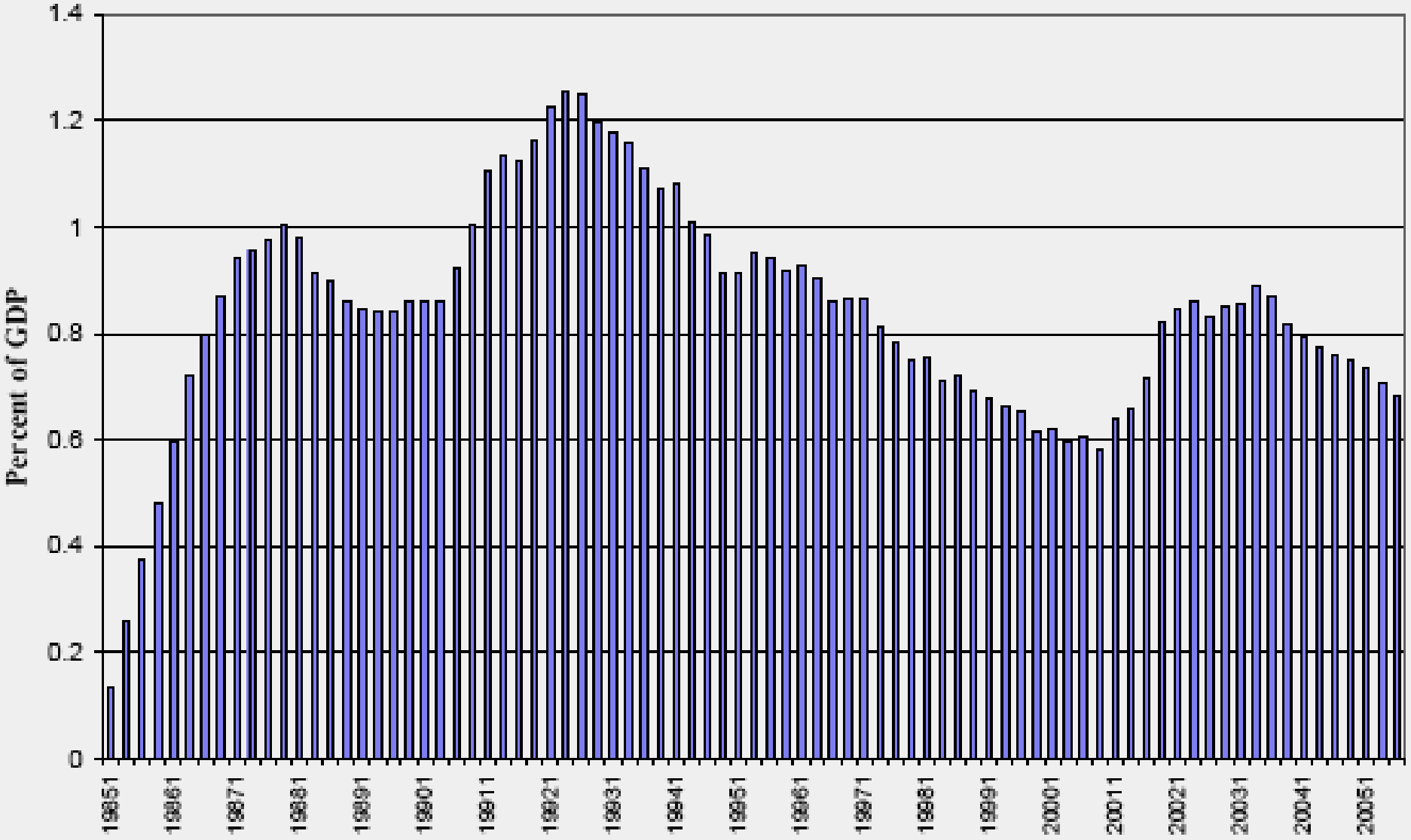


Figure 9: Federal Surplus/Deficit (NIPA) as a Percent of GDP

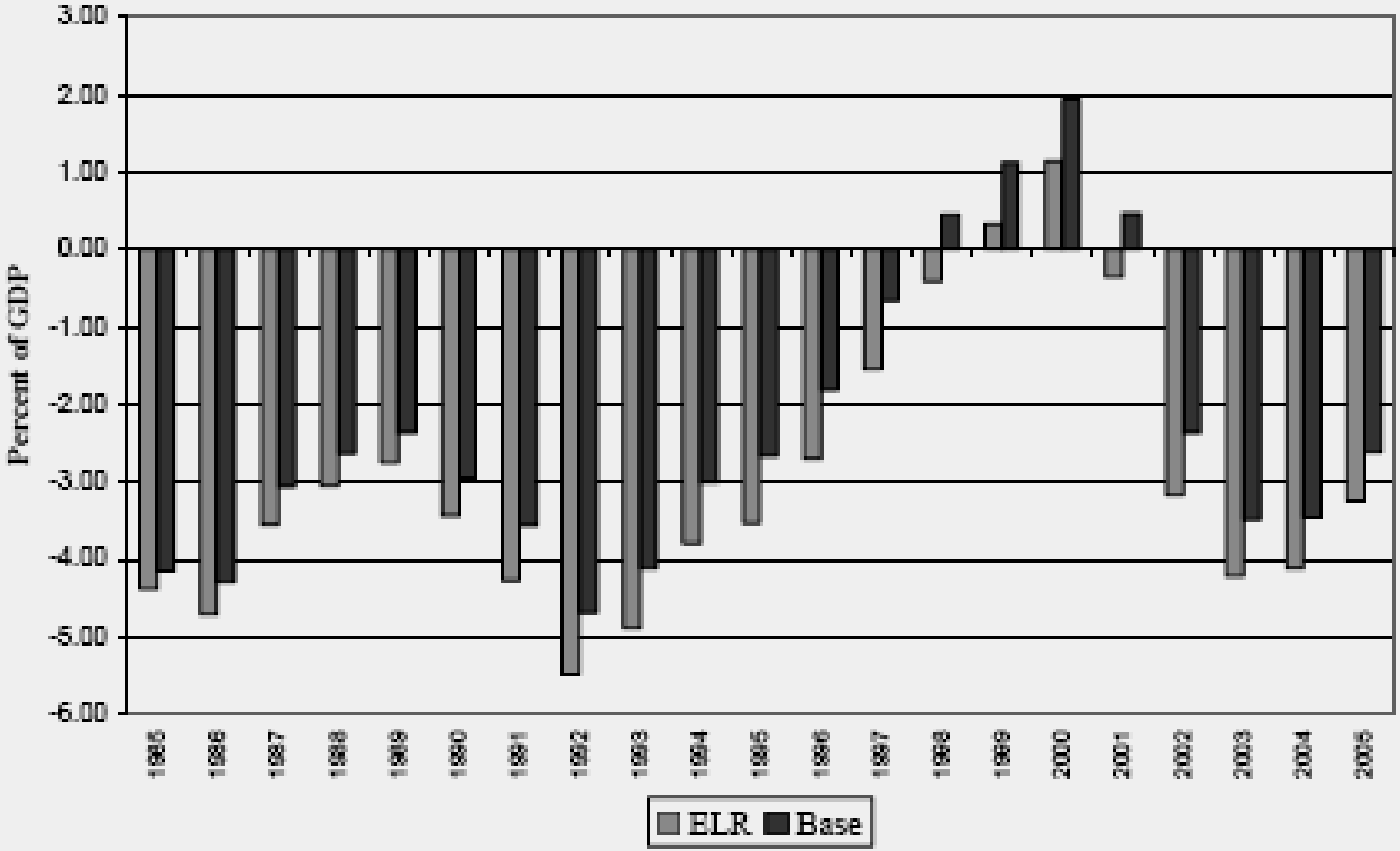
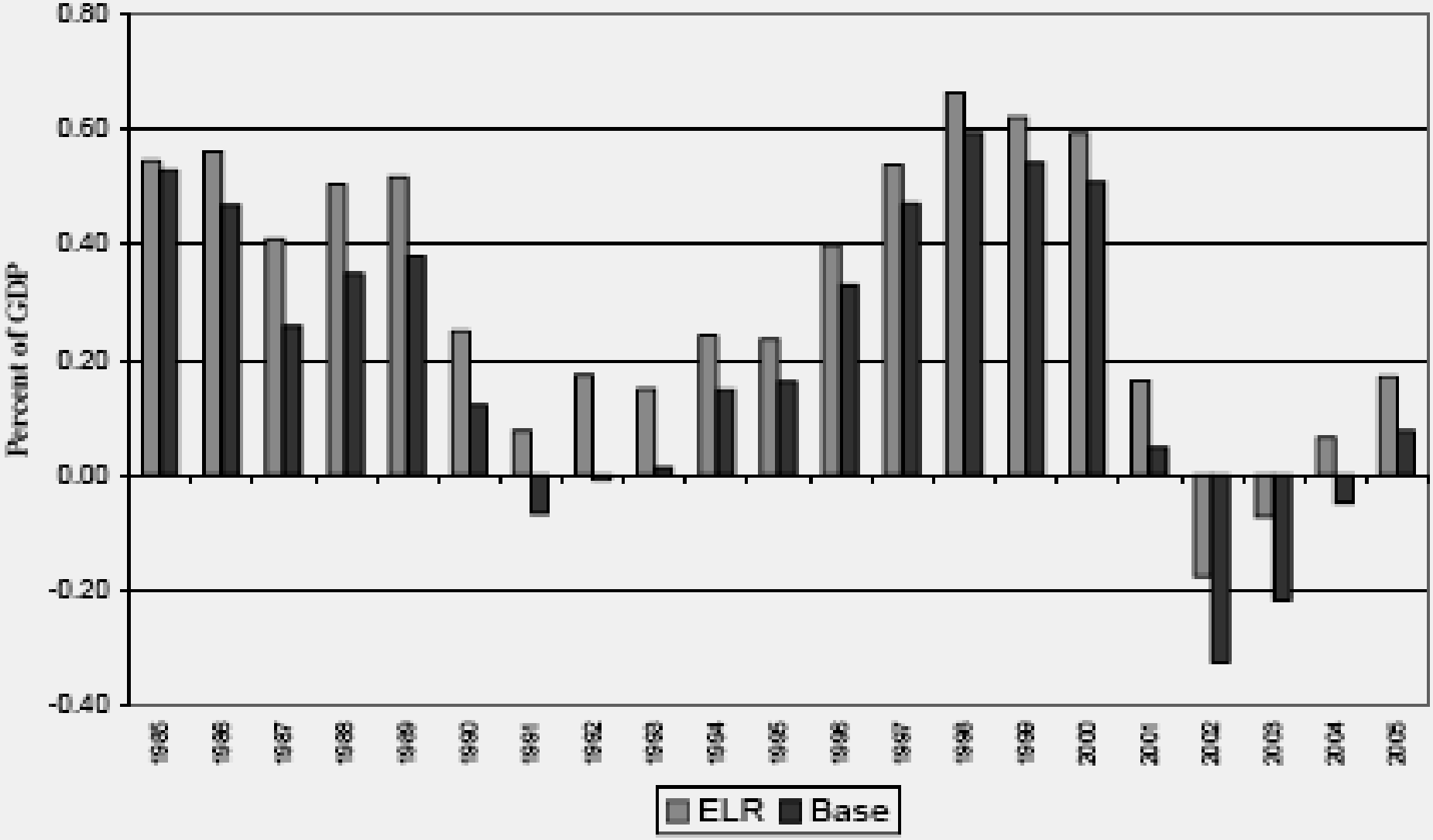


Figure 10: State and Local Surpluses/Deficits as a Percent of GDP



Summary of Business Cycle Simulations

- Higher Level of real GDP throughout, adjusts countercyclically
- Private sector employment raised permanently; comparison to base is countercyclical
- Inflation rises slightly to begin, then initial effect fades.
- Countercyclical behavior of inflation compared to base
- Modest "cost" of around 1% of GDP; smaller effect on deficits

EG and Stochastic Simulation

1. Begin with historical errors added; base case = actual

2. Draw residuals from a quarter randomly from range of historical quarters (1952:4 -2005:3 here)

3. Add drawn residuals to existing residuals for the quarter

4. Solve model's 130 equations for the quarter.

5. Repeat 1-4 for next quarter of simulated period.
   Period simulated is 1993-1997 (20 quarters)

6. Repeat 1-5 100x (2000 total quarters simulated)

7. When Fed is included, historical errors used, but no draws.

Stochastic Simulation

Fair's Measure of Variability for all 20 quarters in Simulation j:

$$L_i^j = \frac{1}{T}\sum_{t=1}^{T}(Y_{i,t}^j - Y_{i,t}^*)^2$$

Y^j_{it} is simulated value of variable i in quarter t

Y^*_{it} is BASE value of variable t in quarter t

T=20 here

Stochastic Simulation

Fair's Measure of Variability for Variable i for all J simulations:

$$L_i = \sqrt{\frac{1}{J}\sum_{j=1}^{J} L_i^j}$$

L^j_t is from previous slide

J=100 here

L_i is thus a summary measure of variability for 2000 quarters

Fair's Interest Rate Rule

$$r_t = \alpha_0 + \alpha_1 r_{t-1} + \alpha_2 \pi_t + \alpha_3 u_t + \alpha_4 \Delta u_t + \alpha_5 \Delta r_{t-1} + \alpha_6 \Delta r_{t-2} + \alpha_7 \left(\%\Delta M1_{t-1}\right) + \alpha_8 \delta_{79-82} \left(\%\Delta M1_{t-1}\right) + \varepsilon_t$$

- Fed's interest rate target reacts positively to inflation and negatively to unemployment rate; fit to historical data.
- Fair 2004, 2005, 2006 show that reaction to change in inflation is about 1.0
  - New Consensus view--greater than 1.0 is necessary
  - Fair 2005 tests 1.5 and 2.5, as well as 1.0

Variability Estimates from Stochastic Simulation: Values of *L*

	Price Level	*Inflation*	*Real GDP*	*Real GDP Growth*	*Unemployment Rate*	*Short-Term Interest Rate*
1. Base (No Fed Rule)	2.17	1.70	2.08	2.75	1..43	0.00
3. Estimated Fed Rule	1.72	1.58	1.67	2.73	1.13	1.48
4. Modified Rule (1.5)	1.70	1.57	1.70	2.73	1.13	1.69
5. Modified Rule (2.5)	1.69	1.57	1.75	2.75	1.12	2.38

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5. Modified Rule (2.5)	1.69	1.57	1.75	2.75	1.12	2.38
20. ELR (U, No Fed)	2.08	1.63	1.80	2.61	1.33	0.00
21. ELR (U, Fed)	1.64	1.57	1.53	2.60	1.07	1.36
26. ELR (U, ½Prod, No Fed)	2.06	1.62	1.62	2.49	1.33	0.00
27. ELR (U, ½Prod, Fed)	1.63	1.57	1.44	2.48	1.07	1.36
30. ELR (U, Prod, No Fed)	2.04	1.62	1.41	2.39	1.32	0.00
31. ELR (U, Prod, Fed)	1.62	1.58	1.39	2.38	1.07	1.36

Indirect Business Tax Rate Rule

$$\tau_t = \tau_t^* + 0.125\left[.5\left(\frac{y_{t-1} - y_{t-1}^*}{y_{t-1}^*}\right) + .5\left(\frac{y_{t-2} - y_{t-2}^*}{y_{t-2}^*}\right)\right] + 0.125[.5(\pi_{t-1} - \pi_{t-1}^*) + .5(\pi_{t-2} - \pi_{t-2}^*)]$$

- Simulated in Fair (2004, 2005) to see if it aids Fed rule
- Tax rate rises (falls) when real GDP is above (below) target level
- Tax rate rises (falls) when inflation is above (below) target rate

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6. Tax Rule (No Fed Rule)	2.10	1.62	1.94	2.74	1.38	0.00
7. Tax Rule w/ Fed Rule	1.69	1.57	1.61	2.73	1.11	1.41
22. ELR (¾U, No Fed)	2.12	1.64	1.87	2.64	1.36	0.00
23. ELR (¾U, Fed)	1.66	1.57	1.56	2.63	1.09	1.38
24. ELR (½U, No Fed)	2.17	1.65	1.96	2.68	1.40	0.00
25. ELR (½U, Fed)	1.69	1.57	1.60	2.66	1.11	1.41

Seidman and Lewis's (2002) Transfer Rule

$$tr_t = \alpha\left[\left(\frac{y^*_{t-1} - y_{t-1}}{y^*_{t-1}}\right) - \chi\right] \times y^*_{t-1}$$

- Asymmetric; no transfer triggered if output gap is not positive (though effect is not as asymmetric as they think!)
- F1: $\alpha = 0.5$, $\chi = 2\%$ (very similar effects to tax rate rule)
- F2: $\alpha = 1.5$, $\chi = 2\%$
- F3: $\alpha = 1.5$, $\chi = 0\%$

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3. Estimated Fed Rule	1.72	1.58	1.67	2.73	1.13	1.48
4. Modified Rule (1.5)	1.70	1.57	1.70	2.73	1.13	1.69
5. Modified Rule (2.5)	1.69	1.57	1.75	2.75	1.12	2.38
12. SL (F2, β=0, No Fed)	2.07	1.61	1.81	2.76	1.34	0.00
13. SL (F2, β=0, Fed)	1.68	1.56	1.53	2.74	1.10	1.40
20. ELR (U, No Fed)	2.08	1.63	1.80	2.61	1.33	0.00
21. ELR (U, Fed)	1.64	1.57	1.53	2.60	1.07	1.36
28. ELR (½U, ½Prod, No Fed)	2.16	1.64	1.84	2.60	1.40	0.00
29. ELR (½U, ½Prod, Fed)	1.68	1.57	1.54	2.59	1.11	1.41

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5. Modified Rule (2.5)	1.69	1.57	1.75	2.75	1.12	2.38
16. SL (F3, β=0, No Fed)	1.94	1.57	1.45	2.76	1.21	0.00
17. SL (F3, β=0, Fed)	1.62	1.53	1.21	2.75	1.02	1.33
26. ELR (U, ½Prod, No Fed)	2.06	1.62	1.62	2.49	1.33	0.00
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Stochastic Simulation Summary

- EG policy has stabilization properties similar to those of other fiscal policy rules.
- Fed is able to "lean against the wind" less than without fiscal policy rules.
- Intuitively, greater stabilization results from more efficient ELR buffer stock and greater productivity of ELR workers.
- Unlike other rules, EG policy not beholden to policymakers' forecasts or ideologies regarding the nature of the economy.

Concluding Remarks

- Within the Fairmodel, EG policy permanently raises employment and real GDP while providing the economy with a strong countercyclical balancer — Full Employment AND Price Stability!

- Further modeling issues:
  - Individual decision to take ELR job—particularly important where informal sector is large.

  - Model uncertainty—continue to simulate EG policy in various macroeconometric models and test the EG policy against alternative policies.