The Taylor rule at 30

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How to get back on track: A policy conference
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The Taylor rule at 30

1. Some remarks on Taylor (1993) and Taylor's contributions
2. Taylor rules in macro models and policy practice
3. Corona, inflation surge and how to get back on track

1. About Taylor (1993) & Taylor's contributions

The Taylor rule at 30!

Carnegie-Rochester Conference Series on Public Policy 39 (1993) 195-214
North-Holland

Discretion versus policy rules in practice

John B. Taylor*
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Taylor (1993) – An exercise in estimation?

- Sometimes, students see this as a reaction function estimated to fit the data on interest rates, output and inflation.

$$r = p + .5y + .5(p - 2) + 2$$

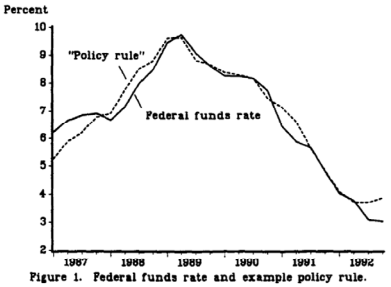


Figure 1. Federal funds rate and example policy rule.

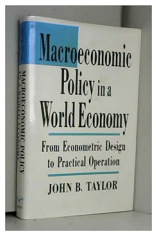
r is the federal funds rate,
p is the rate of inflation over the previous four quarters
y is the percent deviation of real GDP from a target.

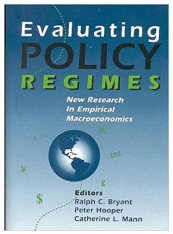
Yet, the approach taken was the other way around …

This paper examines how recent econometric policy evaluation research on monetary policy rules can be applied in a practical policymaking environment. According to this research, good policy rules typically call for changes in the federal funds rate in response to changes in the price level or changes in real income. An objective of the paper is to preserve the concept of such a policy rule in a policy environment where it is practically impossible to follow mechanically any particular algebraic formula that describes the policy rule. The discussion centers around a hypothetical but representative policy rule much like that advocated in recent research. This rule closely approximates Federal Reserve policy during the

New rational expectations macro delivering tools for policy

[1]The forthcoming volume by Bryant, Hooper, and Mann (1993) summarizes much of the empirical research with large multicountry models. A recent Federal Reserve System conference summarized in Taylor (1992) was largely devoted to the analysis of policy rules. A prototype empirical analysis was provided by Taylor (1979) with a full multicountry analysis described in Taylor (1993). Research by McCallum (1988) has also generated considerable interest in econometric evaluation of policy rules. Much of the material in this paper is drawn from Taylor (1993).



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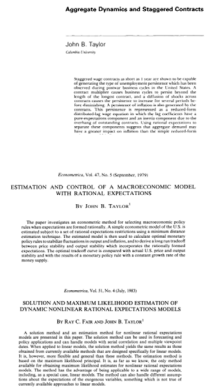
Built on Taylor's preceding seminal contributions

- ***Taylor contracts:*** AER 1979, JPE 1980, „Aggregate dynamics and staggered contracts" laid foundations for analysis of real effects of monetary policy and New-Keynesian Phillips curve
- ***Taylor curves***: Econometrica 1979, „Estimation & control of a macroeconomic model with rational expectations", laid foundations for evaluating policy tradeoffs.
- ***Fair-Taylor method***: Econometrica 1983, how to solve and estimate nonlinear macro models with rational expectations.


Aggregate Dynamics and Staggered Contracts

John B. Taylor

ESTIMATION AND CONTROL OF A MACROECONOMIC MODEL WITH RATIONAL EXPECTATIONS

SOLUTION AND MAXIMUM LIKELIHOOD ESTIMATION OF DYNAMIC NONLINEAR RATIONAL EXPECTATIONS MODELS

Nobel Prizes have been given …

"*for having developed and applied* ***dynamic models*** *for the analysis of economic processes*." , Tinbergen 1969.

" … *and for his demonstration of the* ***complexity of stabilisation policy.***", Friedman 1976.

"*for having developed and applied the hypothesis of rational expectations, … and* ***deepened our understanding of economic policy***", Lucas 1995.

"*for … the* ***time consistency of economic policy*** *and driving forces behind business cycles*", Kydland-Prescott, 2004.

"*for their empirical research on* ***cause and effect*** *in the macroeconomy*", Sargent-Sims, **2011.**

I think it is about time to recognize …

… the huge progress in monetary macroeconomics; the advances in New Keynesian modeling of real effects of monetary policy; and the design of feedback rules for stabilization policy with wide impact on policy practice.

I'd say it is time for a prize to be given …

> "*for modeling the linkages between the real and monetary sides of the macroeconomy and developing effective rules for stabilization policy.*"

2. Taylor rules in macro models and policy practice

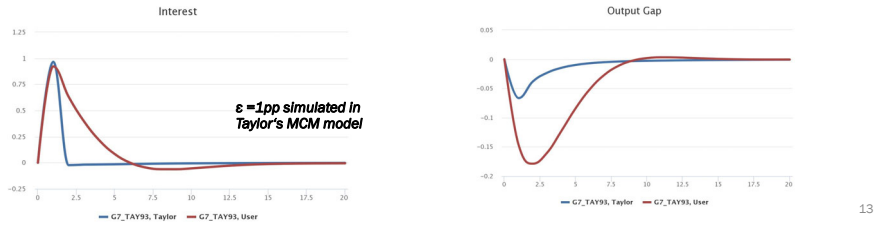
Feedback rules became an essential element of macro models

- Because households and firms are forward-looking, model solution needs to account for the endogenous policy reaction and **determine expectations and policy jointly**.
- Since 1990s macro models include rules for
  - **monetary policy** that respect the **Taylor principle**, i.e.nominal interest changes more than one-for-one with inflation/expectations,
  - **and for fiscal policy** that stabilize debt-to-GDP ratios.

Rule-based-policy vs deviations

- Taylor called for rule-based, predictable policy. This exploits power of expectations.
- Deviations **ε** have mall effects, if expected to be temporary. If interest rates exhibit persistence, deviations have big effects.

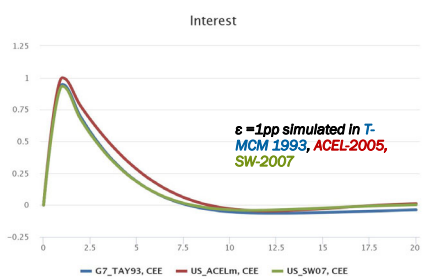
$i_t = a_0 + 1.5\pi_t + 0.5y_t + \varepsilon_t$ vs $i_t = a_0 + 0.8i_{t-1} + 1.5\pi_t + 0.5y_t + \varepsilon_t$

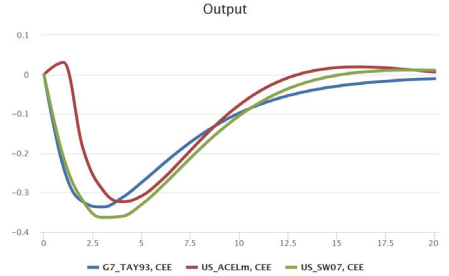


Subsequent DSGE models with similar policy effects as Taylor 93

CEE rule used by Christiano, Eichenbaum and Evans (2005) simulated in Taylor-MCM, CEE and Smets and Wouters (2007) models.

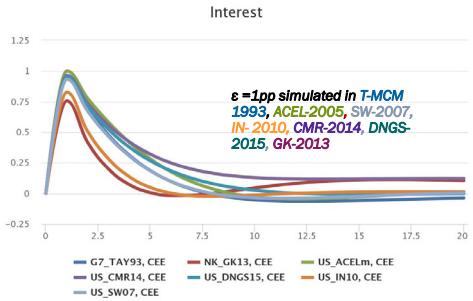
$$i_t = 0.8i_{t-1} + 0.3\pi_t + 0.08y_t + \varepsilon_t$$

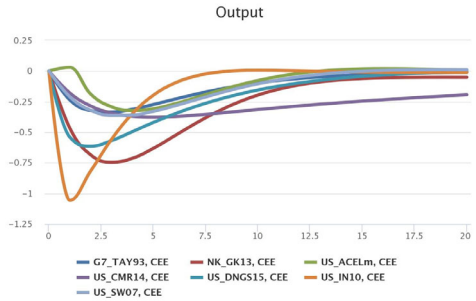




Post-GFC macro-financial models: Sharper effects of policy shocks on GDP

- Housing (IacoNeri2010), financial accel. (Christiano-Motto-Rostagno 2014, Del-Negro-Schorfheide2015), banking capital, (Gertler-Karadi 2013) vs TMCM, CEE, SW





Find effective & robust rules that perform well across models

- (Taylor 1993, 1999), model averaging in Taylor-Wieland (2012)

TABLE 4.—OPTIMIZED MODEL-AVERAGING RULES

OBJECTIVE: Min $\sum_{m \in M} \frac{1}{3}(\mathrm{Var}(\pi_m) + \mathrm{Var}(y_m) + \mathrm{Var}(\Delta i_m))$;

RULES: $i_t = \rho i_{t-1} + \alpha\pi_t + \beta_0 y_t + \beta_1 y_{t-1} + \beta_\Delta \Delta y_t$

Set of Equally Weighted Models: $M = \{SW, TAYLOR, ACEL\}$	ρ	α	β_0	β_1	β_Δ
2-parameter rule (gap)		2.75	0.52		
3-parameter rule (gap)	1.05	0.41	0.23		
3-parameter rule (growth)	1.09	0.20			0.76
4-parameter rule (gap)	1.06	0.19	0.67	−0.59	

- Findings extend to including macro-financial models, but policy has sharper effects.

Used in policy practice: The Fed's rules menu (pre-corona)

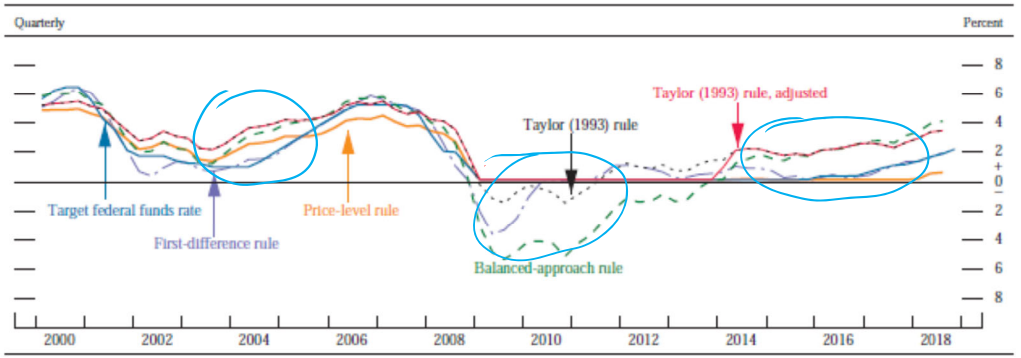
TABLE 5.1. The Rules in the *Monetary Policy Report*

Taylor (1993a) rule: *T93*	$i_t^{T93} = \pi_t + 0.5(\pi_t - \pi^*) + (u_t^* - u_t) + r_t^*$
Balanced-approach rule (BA)	$i_t^{BA} = \pi_t + 0.5(\pi_t - \pi^*) + 2(u_t^* - u_t) + r_t^*$
First-difference rule (FD)	$i_t^{FD} = i_{t-1} + 0.5(\pi_t - \pi^*) + (u_t^* - u_t) - (u_{t-4}^* - u_{t-4})$
Taylor (1993a) adjusted (T93adj)	$i_t^{T93adj} = \max\{i_t^{T93} - Z_t, 0\}$
Price-level rule (PL)	$i_t^{PL} = \max\{\pi_t + 0.5(PLgap_t) + (u_t^* - u_t) + r_t^*, 0\}$

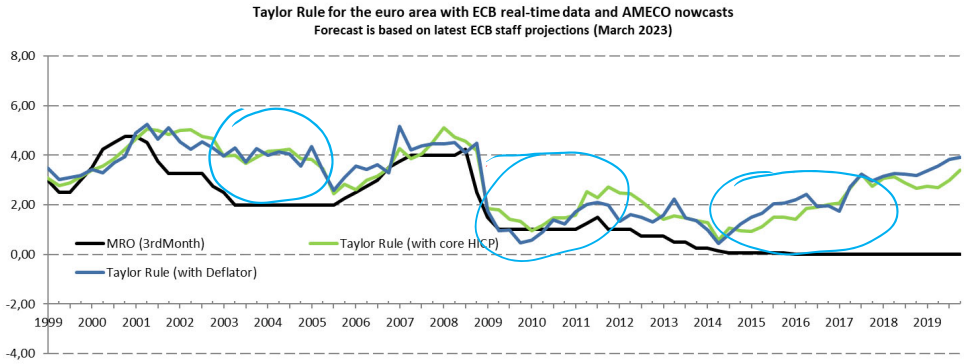
- Taylor-style rules are used around the world (see BIS, ECB, GCEE, etc.)

Useful signals from Taylor rules (pre-corona)

B. Historical federal funds rate prescriptions from simple policy rules



German council of economic advisers: Taylor's rule for the euro area (pre-corona)



3. Corona, inflation surge and how to get back on track

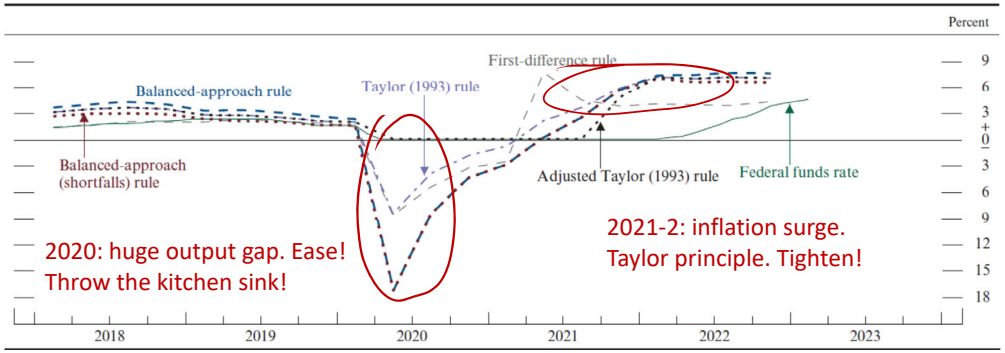
The Fed‘s rules menu (post-corona)

Monetary policy rules

Taylor (1993) rule	$R_t^{T93} = r_t^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + (u_t^{LR} - u_t)$
Balanced-approach rule	$R_t^{BA} = r_t^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + 2(u_t^{LR} - u_t)$
Balanced-approach (shortfalls) rule	$R_t^{BAS} = r_t^{LR} + \pi_t + 0.5(\pi_t - \pi^{LR}) + 2min\{(u_t^{LR} - u_t), 0\}$
Adjusted Taylor (1993) rule	$R_t^{T93adj} = max\{R_t^{T93} - Z_t, \text{ELB}\}$
First-difference rule	$R_t^{FD} = R_{t-1} + 0.5(\pi_t - \pi^{LR}) + (u_t^{LR} - u_t) - (u_{t-4}^{LR} - u_{t-4})$

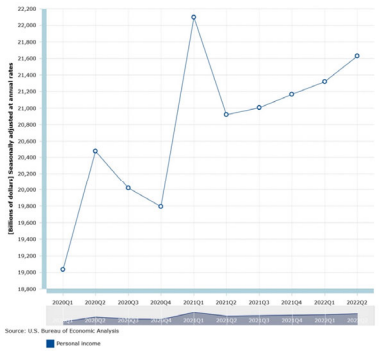
Implications of Fed‘s rules menu post-corona

B. Historical federal funds rate prescriptions from simple policy rules

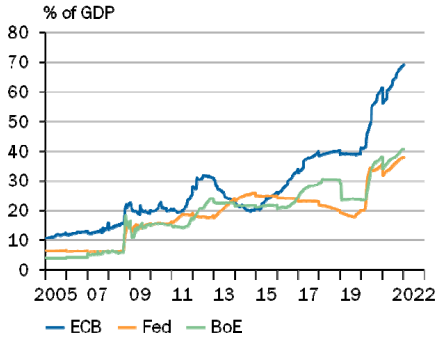


The „kitchen sink“: Large income transfers, government debt purchased by central banks

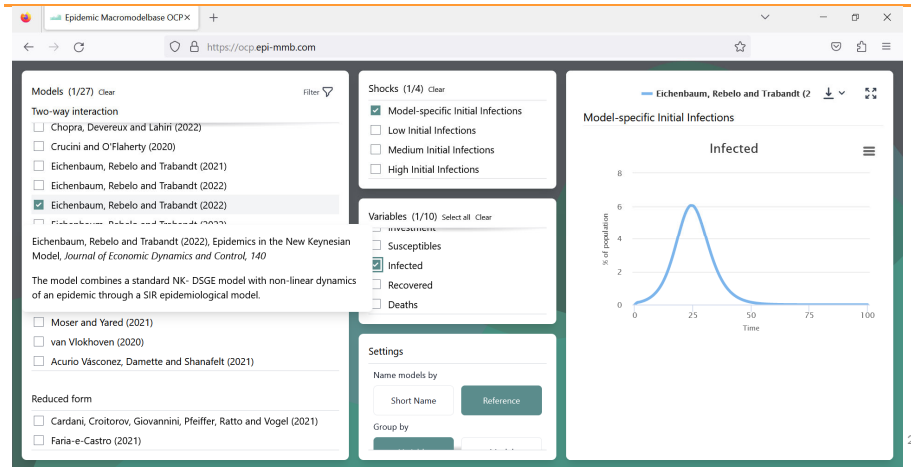
U.S. Personal Income



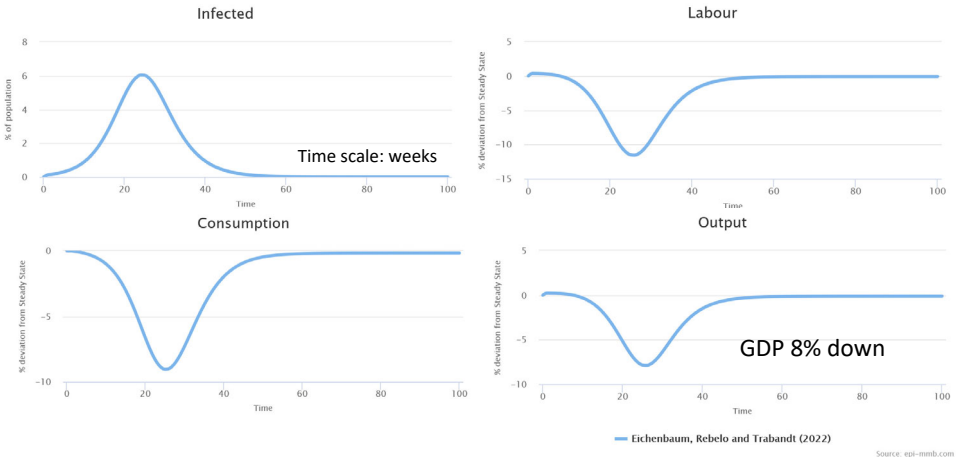
Assets of ECB, Fed and BoE



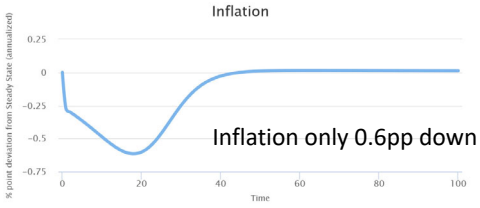
Do they use the right gap in 2020? Check a macro-epi model.

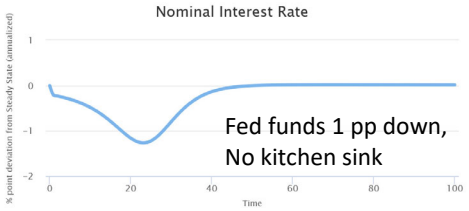


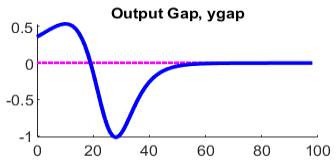
Infections rise, consumption, investment, production & hours worked decline



Relatively small effect on inflation & policy rate (Taylor's rule)

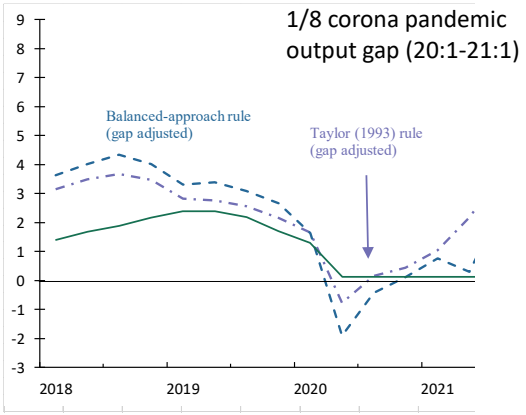






Large supply-side reduction of GDP, relevant output gap only 1/8 of GDP decline.

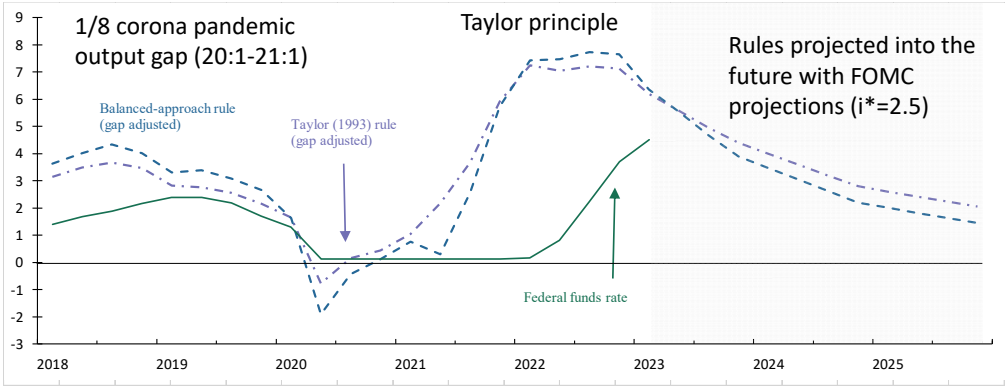
Corona gap adjusted in Taylor rule and BA rule



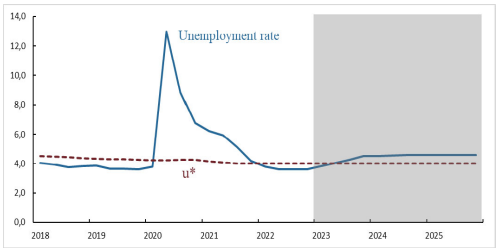
2021-22: Surge of inflation

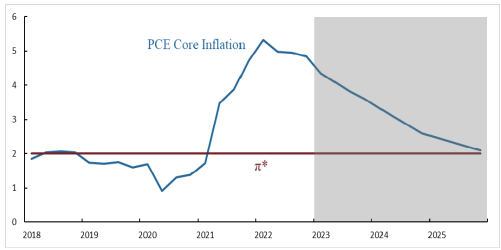
- 2020: Corona crisis much less dis-inflationary than believed at the time.
- 2021: Policy much more expansionary than believed at the time.
  - Gali (2020) estimates that money-financed transfers are much more stimulative than debt-financed (1% of GDP ➔ 50bp inflation)
- 2022: Russian attack on Ukraine and energy crisis add fuel to the fire.

Inflation surge, Taylor principle



Underlying FOMC projections of gaps





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