ECB Conference
„Key developments in monetary economics"
Frankfurt, October 29-30, 2009

Discussion of
„DSGE Models for Monetary Policy"
by
L. Christiano, M. Trabandt & K. Walentin

Volker Wieland
Goethe University Frankfurt

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„The Labor Market in a Monetary Model
of Aggregate Fluctuations"
by
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Outline

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1. Overall Impression

My perspective:

What would I expect from a *Handbook* article as a reader and user?

My conclusions:

(1) Who better to write on „DSGE Models for Monetary Policy" than Larry Christiano.

He made tremendous seminal contributions in this field.

And Mathias Trabandt and Karl Walentin proved their skills in using & extending such models.

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Overall Impression cont.

(2) Interesting and potentially very useful paper!

(3) Paper can make a valuable contribution to a handbook. Good choice!

(4) Authors hard at work at the moment.

Current draft is incomplete and preliminary, but already easier reading than the 1st version.
1st empirical results in conference presentation.

➔ I will raise some questions and offer some suggestions.

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2. Brief Summary

❐ CET 09 start from a medium-size DSGE model, Christiano, Eichenbaum (2005) (CEE) / Altig, Christiano, Eichenbaum, Linde (2004) (ACEL).

➔ ACEL extension with firm-specific capital, technology and investment-specific tech. shocks.

➔ Modelling choices related to researchers beliefs about how the economy responds to shocks.

➔ Substitute „**VAR-based facts**" for beliefs.

➔ Structural parameters chosen s.t. model matches the identified VAR impulse response to 3 shocks.

Brief Summary cont.

❒ CET 09 then introduce unemployment in the model following two different approaches:

Approach 1, Gali (2009).

➔ Unemployment due to wages being too high because of monopoly power.

➔ Extend model by re-interpreting variables, equlibrium conditions unchanged, deduce implications for labor force and unemployment rate recursively.

➔ CTW also introduce employment adjustment costs (claimed to help reduce the parameter for price stickiness closer to micro evidence levels).

Brief Summary cont.

❒ Approach 2, Gertler, Sala, Trigari (2006).

➔ Workers are constantly separating from their positions, and there are frictions that make it difficult to find new work (search costs).

➔ Most authors look only at endogenous finding rate, CET also endogenize the separation rate.

➔ CET note it matters how this is done (total surplus vs firm's surplus determining separation).

➔ Wage bargaining: either by a monopoly union, or atomistic, i.e. by each specialized agent. (Europe vs US according to CET).

Brief Summary cont.

❑ Estimate with VAR impulse function matching a la Rotemberg and Woodford (1997), CEE, ACEL.

➔ CET show how to use a Bayesian approach to implement the procedure for fitting the structural model's impulse response to the estimated VAR impulse response parameters.

❑ Application.

➔ Plan: compare how well model fits the VAR response to the 3 shocks, special focus on new labor market variables with different labor market specifications.

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3. Handbook Character?

❑ „DSGE models for monetary policy" certainly represent a recent and vast research area.

❑ This paper offers no broad overview. It's rather „The world according to Larry".

❑ However, it offers a hands-on, step-by-step example how to extend a particular well-known DSGE model to study labor market dynamics and estimate it with a particular method.

❑ Unemployment is an important concern for monetary policy analysis.

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4. Perspective on Literature?

❐ Reader might expect to obtain a thorough understanding of the literature from a handbook.

➔ Here the paper could be improved.It may be hard to review the DSGE literature on monetary policy, but easy to cite recent contributions to DSGE wiht labor markets.

➔ Some Examples: Krause, Lubik (JME 07), Krause, Lopez-Salido,Lubik (JME 08),

Brown,Merkl, Snower (09),

Christoffel, Kuester (JME 08), Christoffel, Kuester, Linzert (EER 09), Hagedorn, Manovskii (AER 07) and others.

5. Labor Market Facts

❐ ACEL, CET emphasize modeling choices that help better fit micro-evidence on price rigidities.

❐ Perhaps it would also be fruitful to relate labor market modeling choices in DSGE models to labor market facts.

➔ Extent of union membership

➔ Extent of union contract coverage

➔ Extent of specialized labor

➔ Timing of wage negotiations, Taylor (1993)

6. Why are we doing all this?

❒ CTW and Greene say, *„We desire to construct models that generate plausible dynamic responses to shocks?"*

❒ What about *„building models that fit the available time series data for key macro variables"*,

and *„designing effective policies to improve outcomes."*

❒ How useful is the above-mentioned estimation approach to address these questions, and how does it compare to others?

Macro-Econometric Modeling

„Classic" approach:

➔ Models aim to explain time series of key macro variables as a result of endogenous dynamics and random shocks (typically not serially correlated).

➔ Estimate struct. parameters by max. likelihood. Taylor (80,93), Fuhrer, Moore (95), Fuhrer (00), Ireland (04)

Current approaches:

➔ 2-step VAR impulse-response function matching, Rotemberg, Woodford (97), CEE, ACEL. CTW 09 provides Bayesian implementation.

➔ Bayesian estimation (Schorfheide (2000), Smets, Wouters (2003)) aiming to explain observed time series (full set of shocks).

Models, Shocks and Facts

❒ Shocks that are facts: Sep 11, oil embargo 73, war,..

❒ The shocks identified here are <u>model constructs</u> not <u>facts</u>.

➔This is one possible estimation approach among competing methods.

❒ One weakness appears to be that extension to include further shocks is not automatic.

➔ACEL's three shocks cover only part of the variation in key macro time series.

➔Secret of the sucess of Smets & Wouters?

Explains data with full set of shocks, then it is easy to study variability, correlations and conduct policy evaluation.

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7. Impulse Responses: Comparisons

❒ Taylor & Wieland (2009), *„Surprising comparative properties of monetary models"* compare 3 well-known models of U.S economy.

Taylor (1993): earlier-generation New-Keynesian model with rational expectations and nominal rigidities. Used in earlier comparisons.

Christiano, Eichenbaum, Evans (2005) (/ACEL) &

Smets and Wouters (2007): 2 best-known current-generation New-Keynesian DSGE models. More micro-foundations, new estimation methods, new data, 15 years on.

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Interesting Differences

❒ Model structure: CEE 2005 and SW 2007, relative to Taylor 1993,

… have improved micro-foundations, i.e. complete cross-equation restrictions from optimizing behavior of representative households &firms.

… model labor supply and capital accumulation explicitly and allow for technology shocks.

… assume Calvo instead of Taylor contracts and allow for indexation. Also serial correlation of economic shocks.

… are closed economies.

Interesting Differences

❒ Estimation periods and methods:

Taylor 1993: sample period 1971 to 1986. Mostly IV estimation equation by equation, but maximum likelihood estimation of wage block and staggered contract weights.

CEE 2005: sample period 1959 to 2001. Estimation by matching impulse response to monetary shock in an SVAR.

ACEL 2004: same as CEE but also fit technology and investment-specific shock.

SW 2007: sample period 1966-2004. Estimation with Bayesian methods. Full set of shocks.

What is the effect of a monetary policy shock according to these models?

Approach: systematic component of monetary policy is described by an interest rate rule. Consider an additive shock to the rule and investigate its effect on U.S. real GDP.
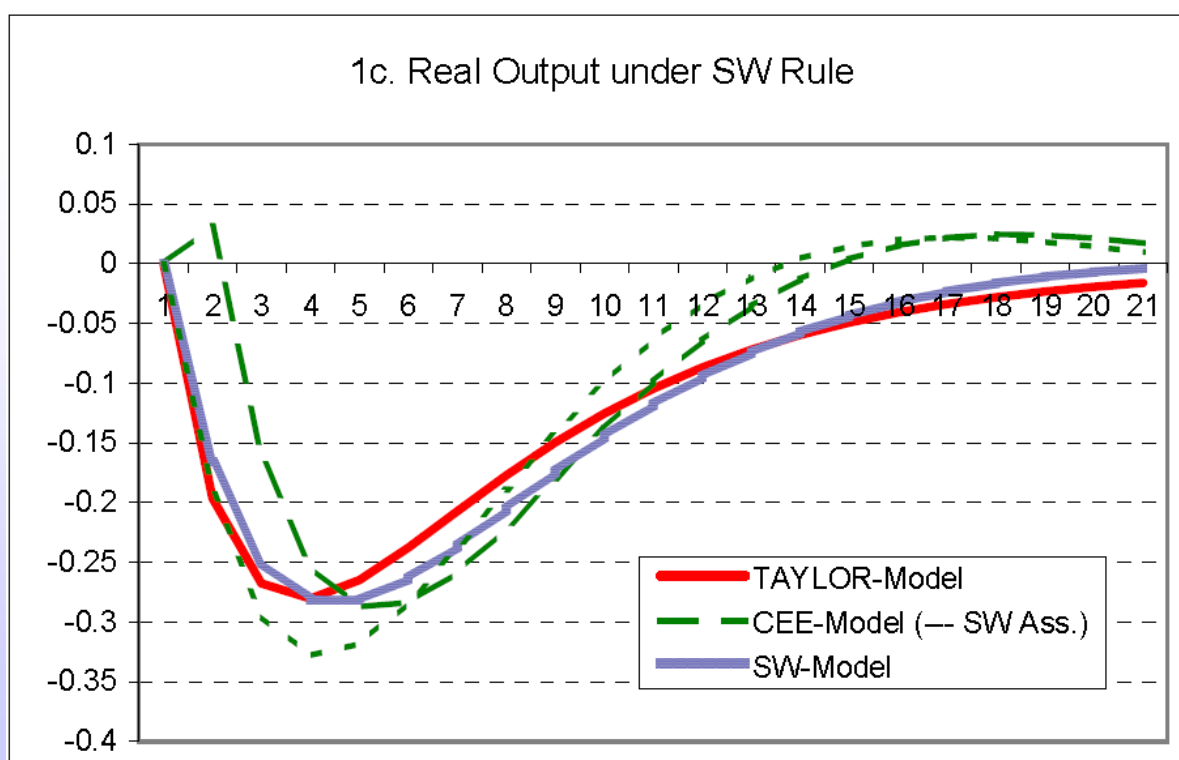
SW 07 rule:

$$i_t = 0.81 i_{t-1} + 0.39 \pi_t + 0.97 y_t - 0.90 y_{t-1} + \varepsilon_t^i$$

CEE05 / CGG02 rule:

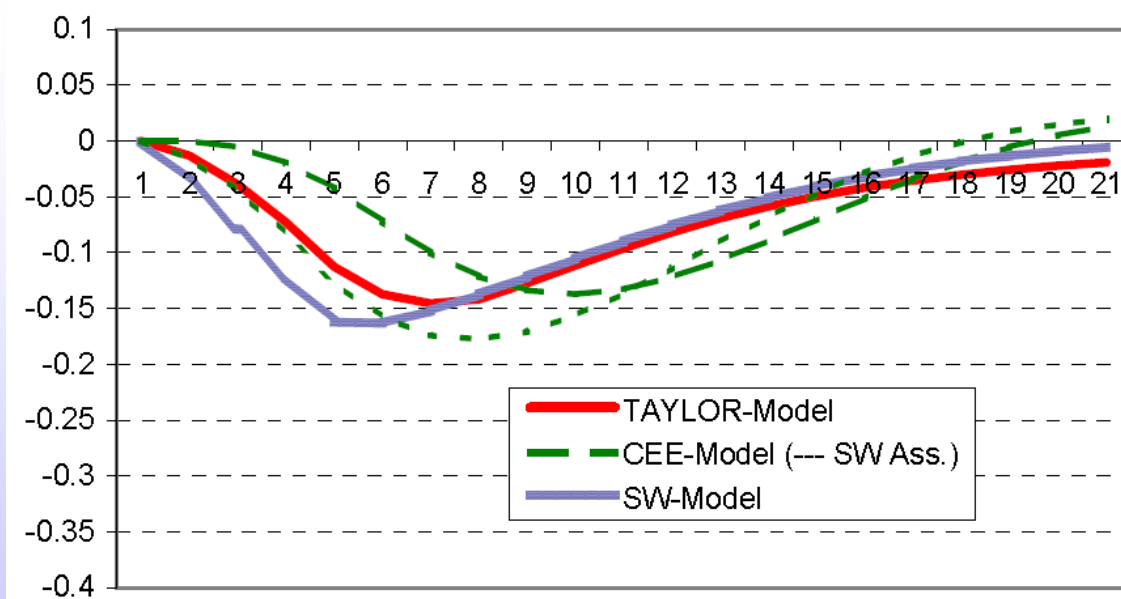$$i_t = 0.80 i_{t-1} + 0.3 E_t \pi_{t+1} + 0.08 y_t + \varepsilon_t^i$$

Effect of Policy Shock on U.S. Real GDP

1c. Real Output under SW Rule

Inflation (SW Rule)

1e. Inflation under SW Rule

Differences between CEE/ACEL and SW

SW largely based on CEE. Extension that includes more shocks aiming to explain all observed inflation and output volatility.

- Partial indexation of wages and inflation instead of full indexation.
- No delayed effect of monetary policy shocks imposed.
- Firms not required to borrow working capital to pay wage bill. No cost-channel.

Surprising Finding 1

❒ The three models agree on the effect of a federal funds rate innovation on US real GDP in spite of differences in structure, estimation method and period.

❒ Also surprising in light of earlier work (Levin, Wieland and Willams (1999, 2003) showing that models built at the Fed in the 90s/00s tended to imply longer-lasting and later peaking effects of policy shocks.
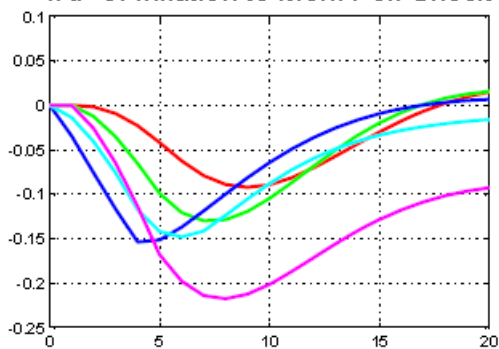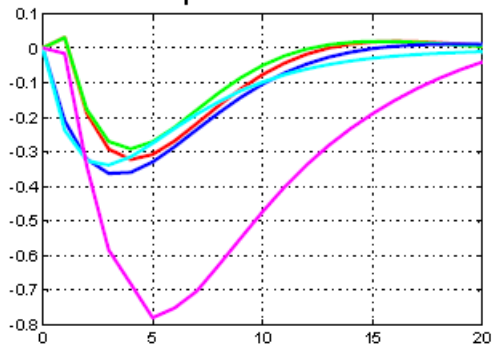
Taylor, ACEL, SW differ from Fed view
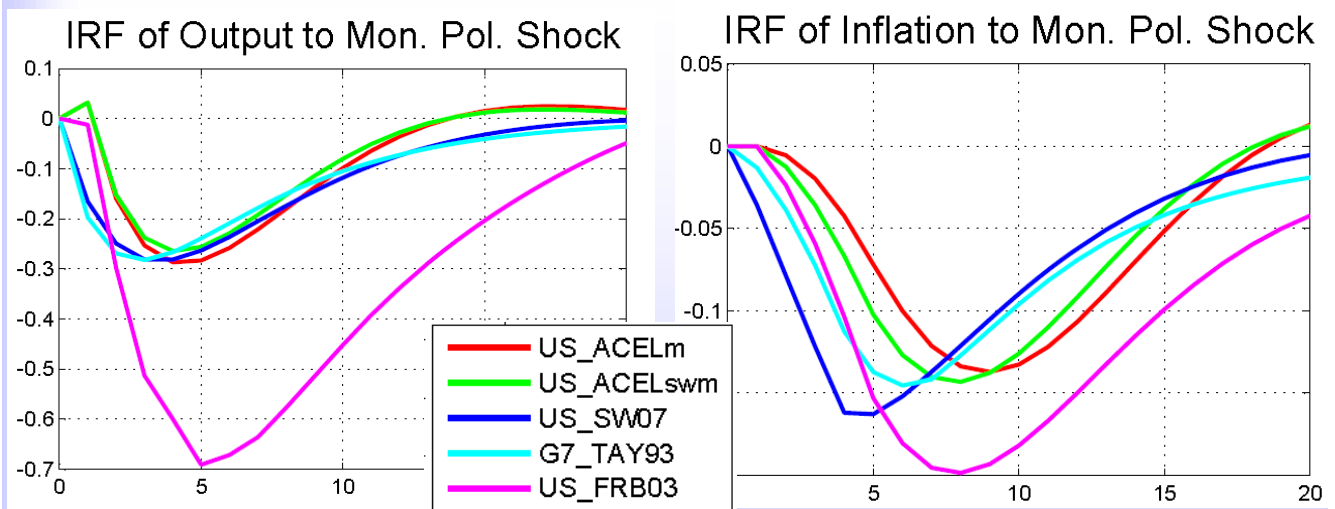
IRF of Output to Mon. Pol. Shock

IRF of Inflation to Mon. Pol. Shock

Legend:
- US_ACELm
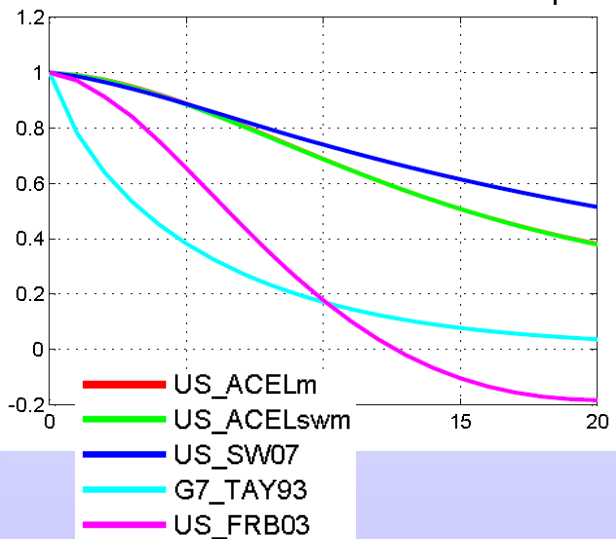- US_ACELswm
- US_SW07
- G7_TAY93
- US_FRB03

❒ SW rule

CEE rule

8. Output / Inflation Persistence

☐ SW rule

Autocorrelation Function of Inflation — CEE rule

Autocorrelation Function of Inflation — Taylor rule

Autocorrelation Function of Output — CEE rule

Autocorrelation Function of Output — Taylor rule

US_ACELm
US_ACELswm
US_SW07
G7_TAY93
US_FRB03
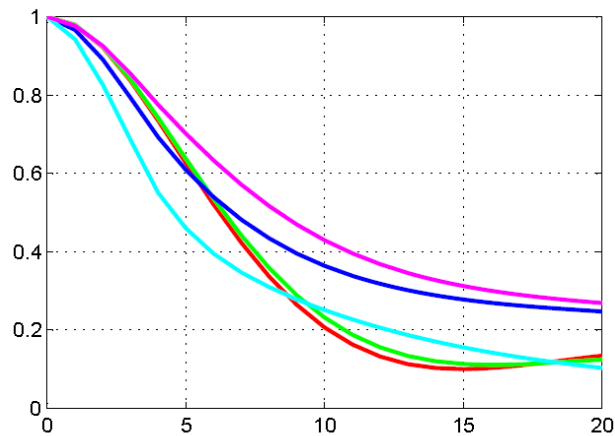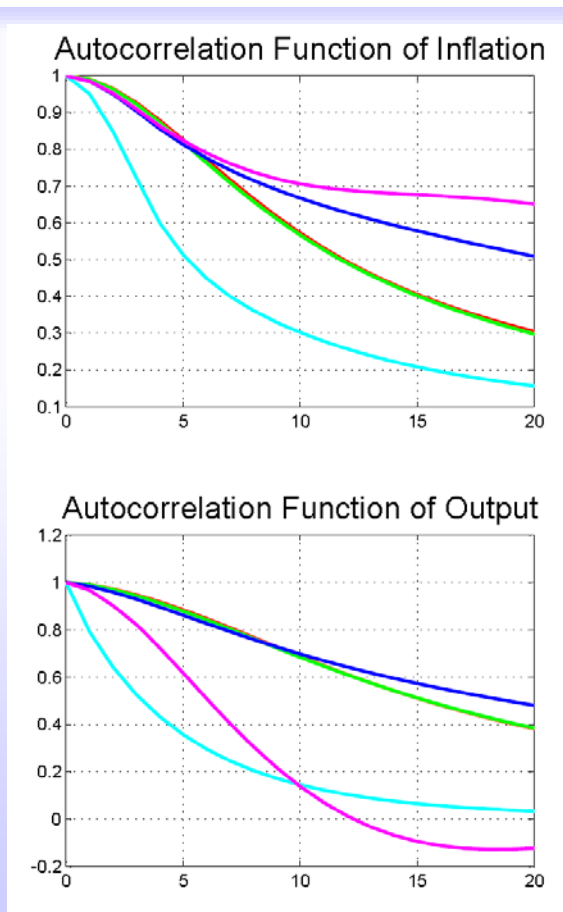
CEE rule   Taylor rule
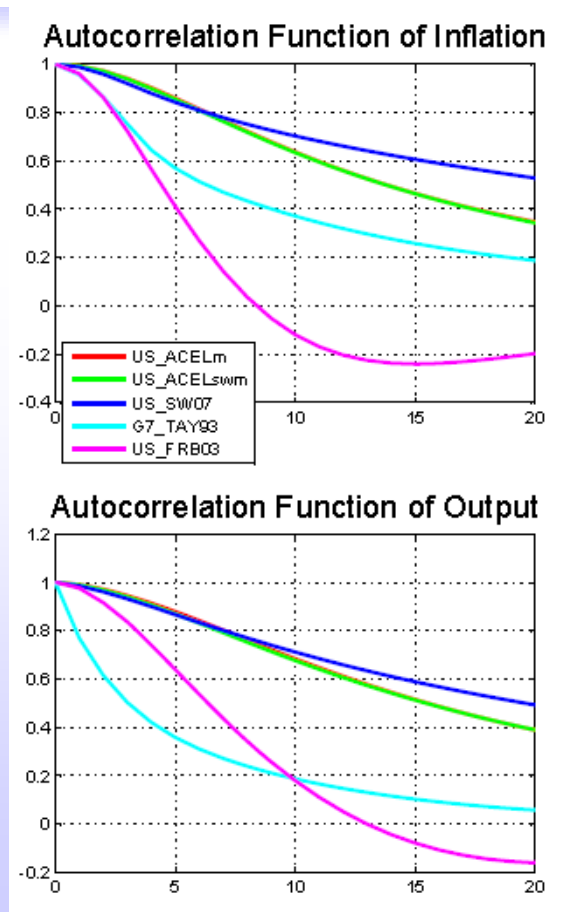
Surprising Finding 2

❑ ACEL and SW imply even greater output persistence than FRB-US and Taylor.

❑ In case of Taylor rule (no lagged interest rate) the inflation persistence in ACEL and SW is also higher than in FRB-US and Taylor.

❑ Perhaps too many sources of persistence in the New DSGE models? In shocks or elsewhere?

9. Optimized Policy Rules

❏ Consider simple rules with interest rate smoothing and lagged output gap:

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

❏ Effectiveness: Choose parameters to minimize ad-hoc loss in a given model:

$$L = Var(\pi) + \lambda_y Var(y) + \lambda_{\Delta i} Var(\Delta i)$$

❏ Robustness: compare performance of rules across models.

Finding # 3 (See Taylor-Wieland 2009)

❏ Confirm earlier work (LWW 99/03) regarding benefits of interest rate smoothing in new models.

❏ New models prefer output growth to output gap, but performance improvement is small.

❏ *Interestingly however, two-parameter rules turn out relatively more robust (see paper)*

10. Conclusion: A Comparative Approach

Given (renewed) wide disagreement about appropriate models for monetary policy, a comparative rather than insular approach would help.

„A New Comparative Approach to Macroeconomic Modelling and Policy Analysis", Wieland, Cwik, Mueller, Wolters Schmidt, 2009.

➔ Formal exposition of approach (comparability)

➔ Computational implementation

➔ Model archive (U.S., Euro, multi-country models).

➔ Easy for individual researchers to study available benchmarks and introduce their model. (innovation over earlier NBER, Brookings comparisons).

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Earlier Comparison Projects

❑ Brookings Institution:

> Bryant, Currie, Frenkel, Masson, Portes, (eds.) (1989), and Bryant, Hooper, Mann (eds) (1993) (Taylor rule)

❑ NBER:

> Taylor (ed.) (1999)

Note! Comparisons involved reseacher teams, each working with its own model.

Instead, we have built a platform that makes a large range of models usable for individual researchers and adding models easy.

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Final Point: Software and Replication

❐ Handbook should,

   not only inform reader about all equations and
   how to derive them in a detailed appendix,

   but also provide access to all data used in
   estimation,

   and all the software needed to replicate model
   simulation and estimation (website).

   Many papers with DSGE models get published,
   but the information made available is not
   sufficient to allow replication. Authors are not
   always willing to supply code after publication.

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