NEW KEYNESIAN MODELS: NOT YET USEFUL FOR POLICY ANALYSIS

V.V. Chari, Patrick J. Kehoe, Ellen R. McGrattan

Alexandra Anghel, Nathanael Soulage

Main Argument

The New Keynesian model cannot be used for policy evaluation, as many of its features are either not structural, or pose other issues.

Key issues:

- Non-structural shocks
  - Wage markups
  - Price markups
  - Exogenous spending
  - Risk premia
- Other
  - Backwardly indexed prices / Mechanism for generating persistant inflation
  - Taylor rule specification

Literature

Authors mainly follow the neoclassical tradition, and respond to the Smets and Wouters 2007 model.

Neoclassical work drawn upon:

- Robert È Lucas, Nancy Stokey 1983
- **V. Chari, Patrick J. Kehoe, and Ellen R. McGrattan 2007**

Competing New Keynesian tradition:

- Lawrence J. Christiano, Martin Eichenbaum, and Charles L. Evans (2005)
- **Frank Smets and Raf Wouters (2007)**

New Keynesian vs. Neoclassical

- Need for macro models to fit macro data well - add shocks and other features
  - Simple models which do not account for most data, but backed by micro evidence
- Discouraging free parameters (= not explicitly supported by micro data)
- Broad agreement on what makes for a good model for policy
  - Generate the type of wedges seen in data from primitive, interpretable shocks
  - Has enough microfoundations

Policy Convergence

Broad agreement on desirable properties of monetary policy:

- Correia, Nicolini, and Teles 2008: optimal monetary policy of sticky and flex price models coincide exactly
  - Slight changes once one complicates NK
  - "Details" of recommendations depend on nature of structural shocks
- Keeping inflation low and stable in order to avoid sectoral misallocations
- Not eliminate all business cycle fluctuations, etc.
- Convergence as a result of evolution of NK towards neoclassical tendencies

Structural vs Reduced-form shocks

- Structural
  - Invariant with respect to the policy interventions considered
  - Interpretable - need to know what shocks to offset and what to accommodate
  - The only kind of shocks that can be considered for policy evaluation
- Reduced-form
  - Not structural
  - Useless in themselves for policy analysis

Method:

Step 1: Prove centrality of labour wedge in economy - create prototype model using business cycle model with added labour wedge (prototype model acts like simplified NK model)

Step 2: Prove that labour wedge is reduced form: set up 2 structural models, each representing a different interpretation of the labour wedge - show that they are observationally identical despite having opposite policy implications

Step 3: Prove equivalence of labour wedge and wage markup shock: compute NK model and find same behaviour as the prototype model from Step 1

P1: Labour wedge = Wage markup shock

P2: Labour wedge = Reduced form shock (identification issue)

THEREFORE

C: Wage markup shock = Reduced form shock

Model and Set Up of the Critique

A Prototype economy with wedges

The Prototype Economy

Following CKM(2007) *business cycle accounting* framework.

Classical standard business cycle model with four reduced-form shocks (*wedges*):

- efficiency wedge: A_t
- labor wedge: $(1 - \tau_{lt})$
- investment wedge: $1/(1 + \tau_{xt})$
- government consumption wedge: g_t

Prototype economy with wedges

Consumers maximize their utility:

$$E_0 \sum_{t=0}^{\infty} \beta^t U\left(c_t, 1 - l_t\right),$$

subject to the budget constraint:

$$c_t + (1 + \tau_{xt})\, x_t = (1 - \tau_{lt})\, w_t l_t + r_t k_t + T_t,$$

and the capital accumulation law:

$$k_{t+1} = (1 - \delta) k_t + x_t,$$

Equilibrium equations

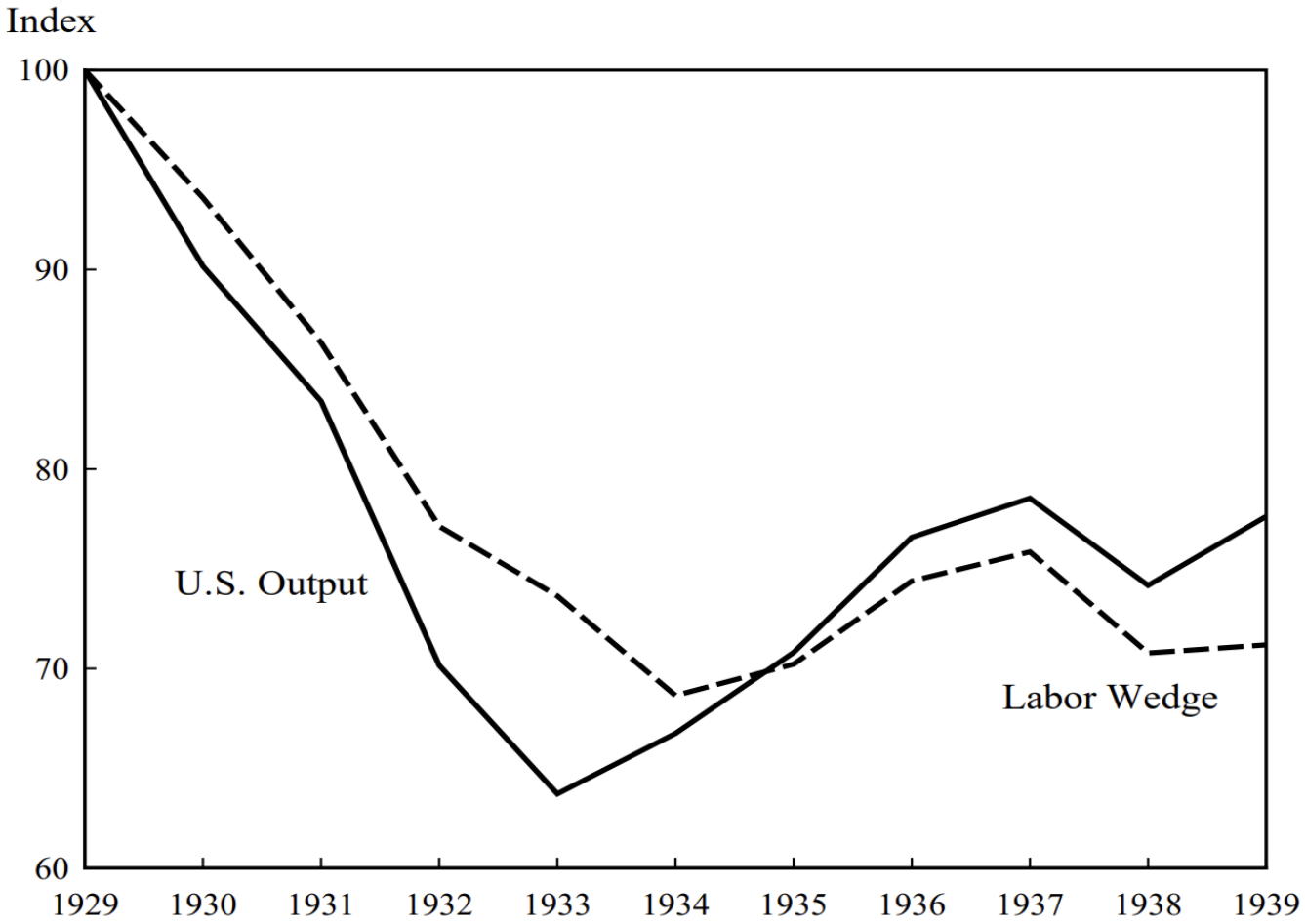
- Resource constraint : $c_t + x_t + g_t = y_t$
- Production function : $y_t = A_t F(k_t, l_t)$
- **Optimality condition :** $\frac{U_{lt}}{U_{ct}} = (1 - \tau_{lt}) A_t F_{lt}$
- Euler equation :
  $U_{ct}(1 + \tau_{xt}) = E_t[\beta U_{ct+1}\{A_{t+1}F_{kt+1} + (1 - \delta)(1 + \tau_{xt+1})\}]$

Prototype economy with wedges *vs.* data

- "CKM (2007) show that the efficiency and labour wedges together account for essentially all the movement in US output, and that the labor wedge plays a central role in accounting for the movement in US labour for the Great Depression period and in postwar business cycles"
- Focus on the labour wedge
- It predicts well the actual evolution of US Labour in the Great Depression period

FIGURE 1A. U.S. OUTPUT AND THE MEASURED LABOR WEDGE

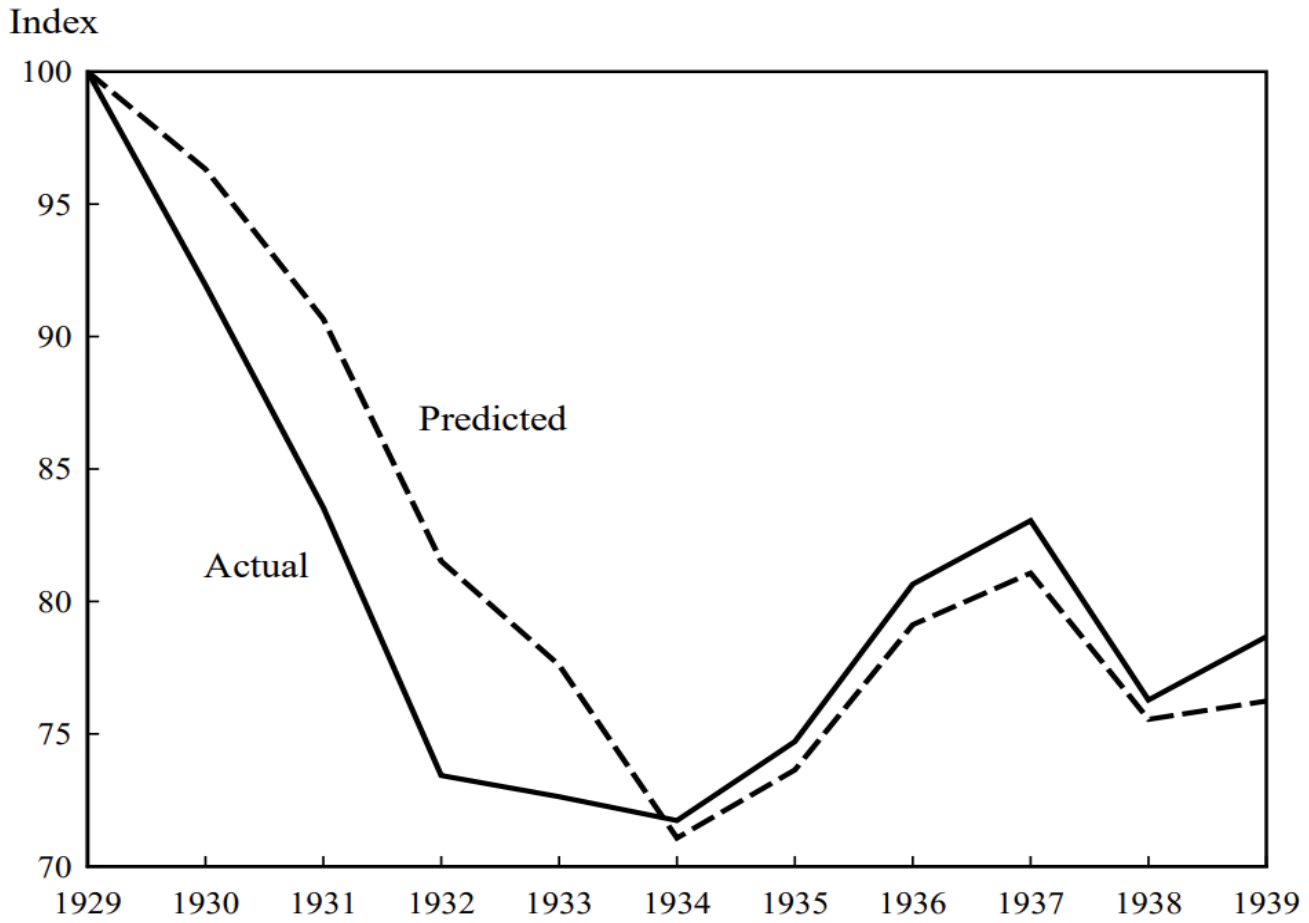
Annual 1929–39, Series Normalized to Equal 100 in 1929



Source: Chari, Kehoe, and McGrattan (2007)

FIGURE 1B. U.S. LABOR AND PREDICTION OF MODEL WITH JUST THE LABOR WEDGE

Annual 1929–39, Series Normalized to Equal 100 in 1929



Source: Chari, Kehoe, and McGrattan (2007)

Two structural models generating labour wedge

- Different ways to generate such a labour wedge in structural models
- Introduction of two structural models that can give rise to labour wedge :
  - Fluctuating government policy toward unions
  - Fluctuating utility of leisure
- These two models have radically diverging policy implications

Fluctuating Government Policy toward unions

Set-Up

- Production function : $y\left(s^{t}\right)=F\left(k\left(s^{t-1}\right), l\left(s^{t}\right)\right)$
- where $l\left(s^{t}\right)=\left[\int_{0}^{1} l\left(i, s^{t}\right)^{1/(1+\lambda)} di\right]^{1+\lambda}$ is an aggregate of the differentiated types of labor $l(i, s^{t})$ with an elasticity of substitution governed by λ

- $\left(s^{t}\right)$ a history of exogenous shocks

Fluctuating Government Policy toward unions

Set-Up: Firm Side

- Maximise discounted value of profits (final good producer) : $\sum_{t=0}^{\infty} \sum_{s^t} q\left(s^t\right)\left[y\left(s^t\right) - x\left(s^t\right) - w\left(s^t\right) l\left(s^t\right)\right]$
- subject to:
  - $k_{t+1} = (1-\delta)k_t + x_t$
  - $y\left(s^t\right) = F\left(k\left(s^{t-1}\right), l\left(s^t\right)\right)$

- Demand for labour type i by final good producer:

  $$l^d\left(i, s^t\right) = \left(\frac{w\left(s^t\right)}{w\left(i, s^t\right)}\right)^{(1+\lambda)/\lambda} l\left(s^t\right)$$

  where $w\left(s^t\right) \equiv \left[\int w\left(i, s^t\right)^{-1/\lambda} di\right]^{-\lambda}$ is the aggregate wage

Fluctuating Government Policy toward unions

Set-Up: Representative Labour Union

Problem of union i is to maximise its members' utility :

$$\sum_{t=0}^{\infty} \sum_{s^t} \beta^t \pi\left(s^t\right) u\left(c\left(i, s^t\right), 1 - l\left(i, s^t\right)\right)$$

subject to

$$c\left(i, s^t\right) + \sum_{s_{t+1}} q\left(s^{t+1} \mid s^t\right) b\left(i, s^{t+1}\right) \leqslant w\left(s^t\right) l^d\left(i, s^t\right) + b\left(i, s^t\right) + d\left(s^t\right)$$

The only distorted FOC is :

$$w\left(i, s^t\right) = (1 + \lambda) \frac{u_l\left(i, s^t\right)}{u_c\left(i, s^t\right)}$$

by symmetry, consumers all choose the same $c(s^t)$, $l(s^t)$,$b(s^{t+1})$, and $w(s^t)$

Fluctuating Government Policy toward unions

Government Policy

- Government pro-competitive policy: limiting the monopoly power of unions by pressuring them to limit their anti-competitive behavior
- In the model: enforcing provisions that make the unions set prices competitively if the markups exceed $\bar{\lambda}(s^t)$, where $\bar{\lambda}(s^t) \leqslant \lambda$.
- Under such a policy, markup charged by unions is $\bar{\lambda}(s^t)$
- The key distorted FOC is now:

$$w\left(s^t\right) = \left[1 + \bar{\lambda}\left(s^t\right)\right] \frac{u_l\left(s^t\right)}{u_c\left(s^t\right)}$$

Fluctuating Government Policy toward unions

Aggregate allocation coincides with a prototype economy :

- Firms :
$$\max \sum_{t=0}^{\infty} \sum_{s'} q\left(s^t\right) \left[F\left(k\left(s^{t-1}\right), l\left(s^t\right)\right) - x\left(s^t\right) - w\left(s^l\right) l\left(s^l\right)\right]$$
$$\text{subject to: } k\left(s^t\right) = (1-\delta) k\left(s^{t-1}\right) + x\left(s^t\right)$$

- Consumers maximise utility :
$$\sum_{t=0}^{\infty} \sum_{s^t} \beta^t \pi\left(s^t\right) u\left(c\left(s^t\right), 1 - l\left(s^t\right)\right)$$

  subject to
$$c\left(s^t\right) + \sum_{s_{t+1}} q\left(s^{t+1} \mid s^t\right) b\left(s^{t+1}\right) \leqslant$$
$$\left[1 - \tau\left(s^t\right)\right] w\left(s^t\right) l\left(s^t\right) + b\left(s^t\right) + d\left(s^t\right) + T\left(s^t\right)$$

  where $d\left(s^t\right) = F\left(k\left(s^{t-1}\right), l\left(s^t\right)\right) - x\left(s^t\right) - w\left(s^t\right) l\left(s^t\right)$

Fluctuating Government Policy toward unions

The only distorted FOC is :

$$[1 - \tau(s^t)]\, w(s^t) = \frac{u_l(s^t)}{u_c(s^t)}$$

PROPOSITION 1: Consider the prototype economy just described, with the stochastic process for labor wedges given by

$$1 - \tau(s^t) = \frac{1}{1 + \bar{\lambda}(s^t)}.$$

The equilibrium allocations and prices of this prototype economy coincide with those of the unionized economy.

Fluctuating utility of Leisure

- "A different policy implication comes from a different structural model in which the labor market distortion is interpreted not as fluctuations in the government's policy toward unions, but as fluctuations in the consumers' value of leisure"
- Consumers' utility function :

$$u\left(c\left(s^{t}\right), 1-l\left(s^{t}\right)\right)=u\left(c\left(s^{t}\right)\right)+\psi\left(s^{t}\right) v\left(1-l\left(s^{t}\right)\right)$$

  - $\psi(s_t)$: exogenous stochastic shock to the utility of leisure
- Consumers maximise utility subject to $c\left(s^{t}\right)+\sum_{s_{t+1}} q\left(s^{t+1} \mid s^{t}\right) b\left(s^{t+1}\right) \leqslant w\left(s^{t}\right) l\left(s^{t}\right)+b\left(s^{t}\right)$
- The firm's problem is the same as before

Fluctuating utility of leisure

Consumer's FOC for labour in this detailed economy :

$$\frac{v'\left(1-l\left(s^t\right)\right)}{u'\left(c\left(s^t\right)\right)}=\frac{w\left(s^t\right)}{\psi\left(s^t\right)}$$

The associated prototype economy is nearly identical to the previous one, with utility function:

$$u\left(c\left(s^t\right),l\left(s^t\right)\right)=u\left(c\left(s^t\right)\right)+\psi\left(s^t\right)v\left(1-l\left(s^t\right)\right)$$

The consumer FOC is now:

$$\frac{v'\left(1-l\left(s^t\right)\right)}{u'\left(c\left(s^t\right)\right)}=\left[1-\tau\left(s^t\right)\right]w\left(s^t\right)$$

Fluctuating utility of leisure

PROPOSITION 2: In the prototype economy just described, with the stochastic process for labor wedges given by

$$1 - \tau\left(s^t\right) = \frac{1}{\psi\left(s^t\right)},$$

the equilibrium allocations and prices of this prototype economy coincide with those of the detailed economy with a fluctuating value of leisure.

Policy implications

The two structural models have contradicting policy implications :

- Fluctuations in Government Policy towards union : "Equilibrium allocations are inefficient. The optimal policy of the government is, then, to limit the monopoly power of unions as much as possible. Crudely put, relentless union busting is optimal."
- Fluctuations in Value of leisure : "The equilibrium allocations are efficient, so *laissez-faire* is optimal."

Conclusion: The two structural models generate the same observations as the prototype model with labour wedge, but they have contradicting policy implications

Critique of the New Keynesian Models

Dubiously structural shocks

Argue: Prototypical NK Model is not very different from the previous prototype growth model with reduced-form shocks

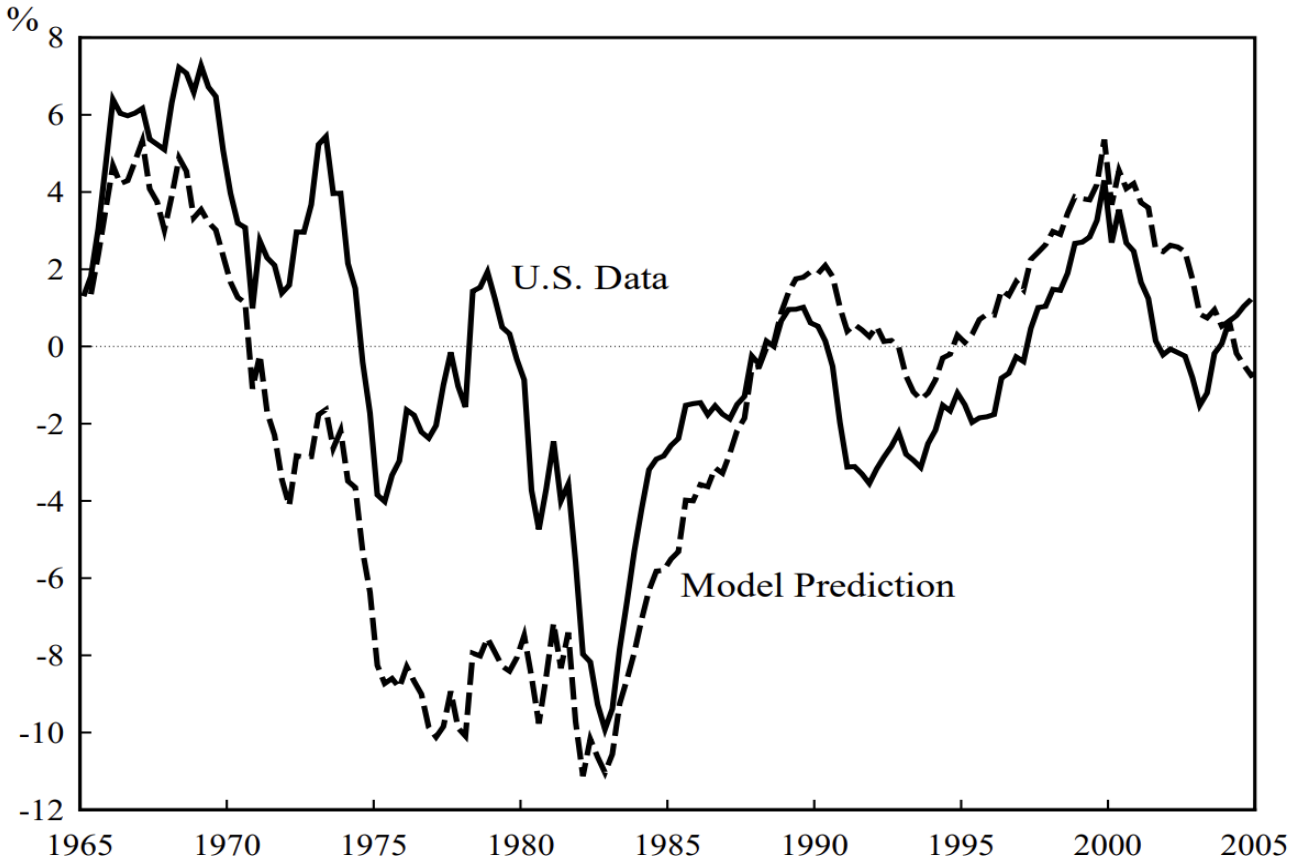
Seven shocks are included in the Smets-Wouters model. Three are arguably structural, but the authors argue that the remaining four are dubiously structural; shocks to:

- wage markups
- price markups
- exogenous spending
- risk premia

They, first, show their centrality in the models' prediction and then explain why they can hardly be interpreted as structural.

FIGURE 2A. U.S. OUTPUT AND PREDICTION OF SMETS-WOUTERS (2007) MODEL WITH THE DUBIOUSLY STRUCTURAL SHOCKS*

Quarterly Percentage Changes, 1965–2005, Series Logged and Detrended

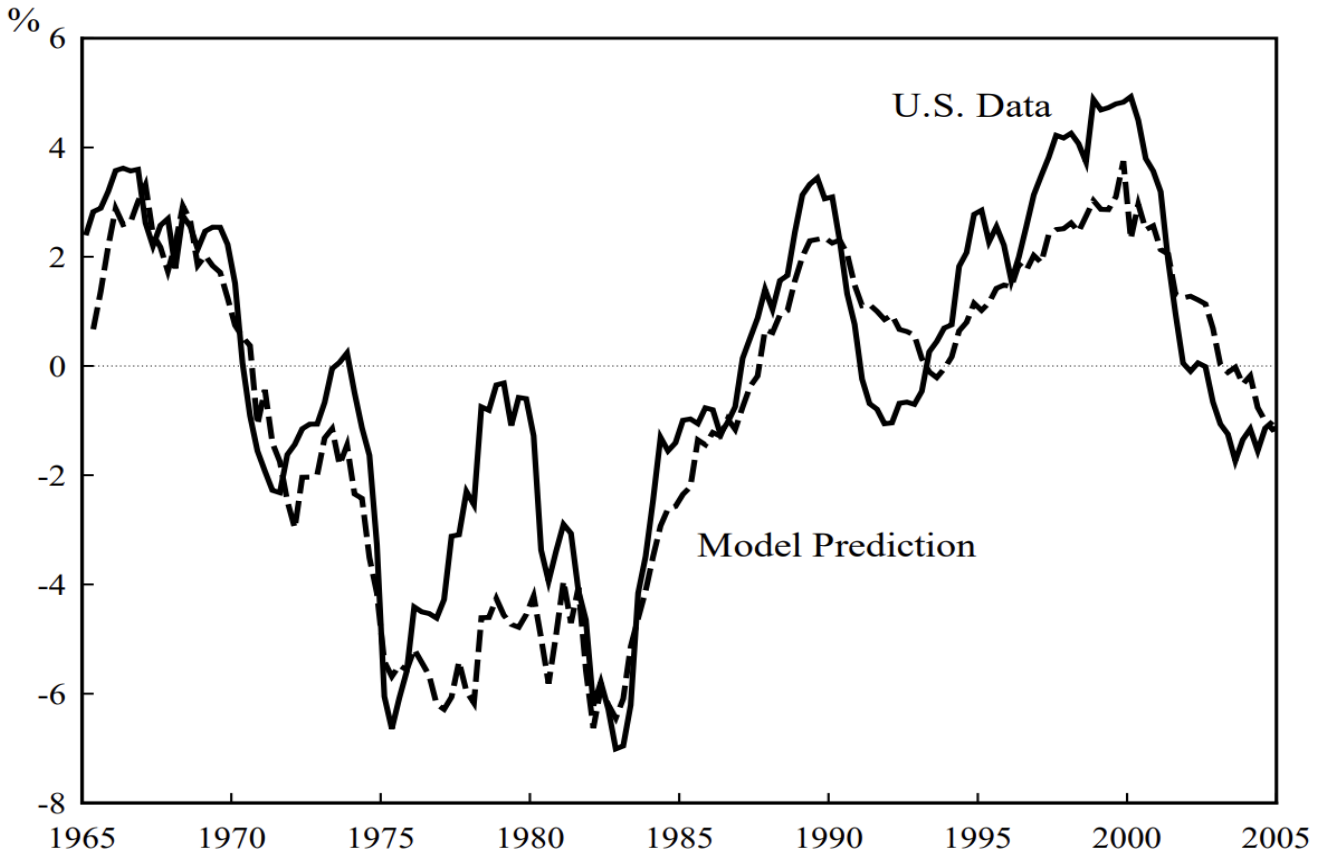


*The dubiously structural shocks include the wage-markup shock, the price-markup shock, the exogenous spending shock, and the risk premium shock.

Source of Actual Data: See Smets and Wouters (2007).

FIGURE 2B. U.S. HOURS AND PREDICTION OF SMETS-WOUTERS (2007) MODEL WITH THE DUBIOUSLY STRUCTURAL SHOCKS*

Quarterly Percentage Changes, 1965–2005, Series Logged and Demeaned

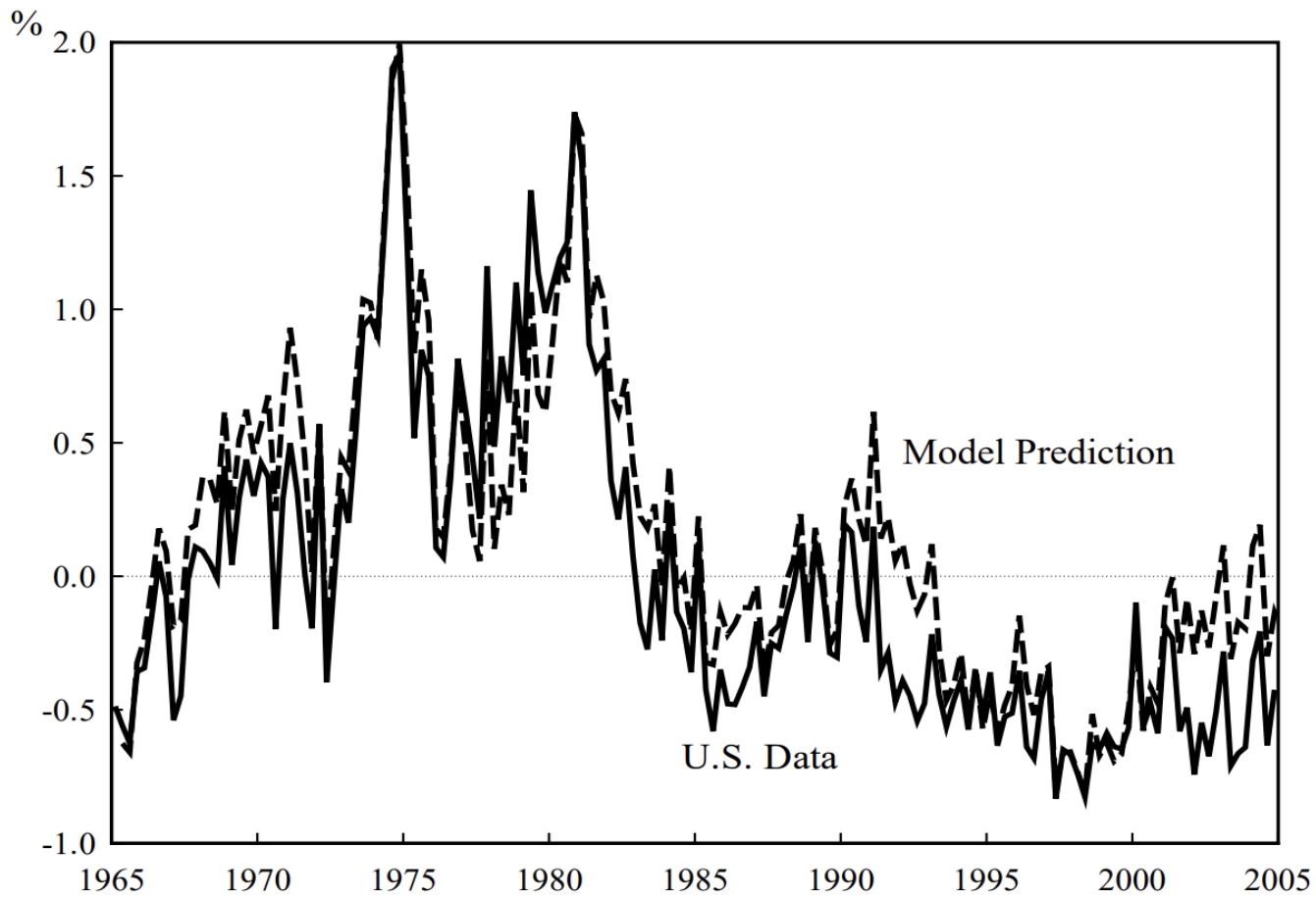


*The dubiously structural shocks include the wage-markup shock, the price-markup shock, the exogenous spending shock, and the risk premium shock.

Source of Actual Data: See Smets and Wouters (2007).

FIGURE 2C. U.S. INFLATION AND PREDICTION OF SMETS-WOUTERS (2007) MODEL WITH THE DUBIOUSLY STRUCTURAL SHOCKS*

Quarterly, 1965–2005, Series Demeaned



*The dubiously structural shocks include the wage-markup shock, the price-markup shock, the exogenous spending shock, and the risk premium shock.

TABLE 1. FORECAST ERROR VARIANCE DECOMPOSITION IN THE SMETS-WOUTERS (2007) MODEL

Horizon	Type of Shock	Each Shock's Percent Contribution to Variance of: Output	Hours	Inflation
4 Quarters	1-Monetary shock	9.1	11.1	4.6
	2-Productivity shock	26.1	8.1	5.1
	3-Investment shock	25.1	26.8	3.3
	4-Risk premium shock	9.9	12.8	0.7
	5-Exogenous spending shock	15.2	20.9	0.5
	6-Price markup shock	26.1	8.1	5.1
	7-Wage markup shock	6.5	12.9	42.9
	All shocks	100.0	100.0	100.0
	Shocks 4—7	39.6	53.9	86.9
10 Quarters	1-Monetary shock	5.9	8.0	5.3
	2-Productivity shock	31.6	4.1	4.5
	3-Investment shock	18.5	18.7	3.6
	4-Risk premium shock	4.2	6.3	0.7
	5-Exogenous spending shock	8.2	13.8	0.7
	6-Price markup shock	11.1	11.4	34.0
	7-Wage markup shock	20.5	37.7	51.1
	All shocks	100.0	100.0	100.0
	Shocks 4—7	44.0	69.2	86.5
1,000 Quarters	1-Monetary shock	2.3	3.4	4.6
	2-Productivity shock	29.5	2.0	4.0
	3-Investment shock	7.9	8.6	3.4
	4-Risk premium shock	1.6	2.6	0.6
	5-Exogenous spending shock	4.2	10.5	1.0
	6-Price markup shock	6.4	6.2	28.6
	7-Wage markup shock	48.2	66.7	57.8
	All shocks	100.0	100.0	100.0
	Shocks 4—7	60.3	86.0	88.0

Note: Output and hours are logged and detrended but not differenced.

The Wage markup shock (SW2007)

The wage markup shock arises in a linearized equation for real wages in Smets-Wouters (as we saw last time)

SW motivated this additive shock as coming from shocks to the labour aggregator G, which relates aggregate labor l_t to a continuum of differentiated types of labour services $l_t(i)$ according to $1 = \int_0^1 G\left(\frac{l_t(i)}{l_t}; \lambda_t\right) di$ where (λ_t) is the *wage markup shock*.

SW linearised equation for real wages

$$\begin{aligned}\widehat{w}_t =& \frac{\beta}{1+\beta} E_t \widehat{w}_{t+1} + \frac{1}{1+\beta} \widehat{w}_{t-1} + \frac{\beta}{1+\beta} E_t \widehat{\pi}_{t+1} - \frac{1+\beta\gamma_w}{1+\beta} \widehat{\pi}_t \\ &+ \frac{\gamma_w}{1+\beta} \widehat{\pi}_{t-1} - \frac{1}{1+\beta} \frac{\left(1-\beta\xi_w\right)\left(1-\xi_w\right)}{\left(1+\frac{\left(1+\lambda_w\right)\sigma_L}{\lambda_w}\right)\xi_w} \\ &\times \left[\widehat{w}_t - \sigma_L \widehat{L}_t - \frac{\sigma_c}{1-h}\left(\widehat{C}_t - h\widehat{C}_{t-1}\right) - \widehat{\varepsilon}_t^L - \eta_t^w\right]\end{aligned}$$

The Wage markup shock (SW2007)

- The discussion focuses on the case with *constant elasticity of substitution*. G takes the form : $\left(\frac{l_t(i)}{l_t}\right)^{1/(1+\lambda_t)}$
- so that :

$$l_t = \left[\int_0^1 l_t(i)^{1/(1+\lambda_t)} di\right]^{1+\lambda_t}$$

- Making (λ_t) stochastic is a way to make the elasticity of substitution between different types of labour stochastic

Equivalent to a Labour Wedge

- Consider stripped-down flexible-wage version of the Smets-Wouters model with period utility function $u\left(c_t, 1 - l_t\right)$
- Workers organized into labour unions, so that union i regroups the workers with labour services of type i.
- FOC for union i is to set the nominal wage for that type of labor $W_t(i)$ so that the corresponding real wage $w_t(i) = W_t(i)/P_t$ satisfies:

$$w_t(i) = (1 + \lambda_t) u_{lt}/u_{ct}.$$

Equivalent to a Labour Wedge

- By symmetry, $w_t(i)$ equals the aggregate real wage w_t. This model, therefore, implies that

$$w_t = (1 + \lambda_t) \frac{u_{lt}}{u_{ct}}$$

- If we compare with the labour wedge in the previous prototype models, we see that inserting the wage markup shock λ_t is equivalent to inserting an exogenous labour wedge into the model (as we did with the prototype).

Interpreting the wage markup shock

- (Recall:) Not possible to use the wedges for policy analysis, as it can have multiple interpretations.
- Estimating the model interpreting the wage markup shock literally, as consisting of fluctuations in the elasticity of substitution for different types of labor: Standard deviation of the markup is 2587%.
- "Clearly, this level of volatility is absurd when it is interpreted as reflecting variations in the elasticity of substitution between workers such as carpenters, plumbers, neurosurgeons, and economists"

Interpreting the wage markup shock

- A literal interpretation of the wage markup shock does not hold.
- CKM argue that the shock is a reduced-form shock, standing for deeper and not yet identified shocks
- "The wage markup shock accounts for much of the fluctuations in labor and inflation, so the model cannot be used for policy analysis until we take a stand on what those deeper shocks are".
- Need to understand what are the deeper shocks, whether they are invariant to policy and whether they can be interpreted as *good* or *bad* shocks by policymakers.

Multiple interpretations

Bargaining power of unions

- *A priori* problematic as bargaining power is related to outside options, which are not invariant to policy
- Assuming invariability, problematic implications nevertheless
  - Bargaining power leads to "bad" fluctuations in the wage-markup shock
  - Therefore these fluctuations should be impeded at all cost
  - Implication: cracking down on unions and consequently eliminating business cycles

Multiple interpretations

The Value of Leisure

Shock reflects changes in consumers' utility of leisure

- Observationally equivalent economy in terms of aggregates to the previous one
  - SW acknowledge that they "cannot identify whether their wage markup shocks are really shocks to the elasticity of substitution in the labor aggregator, or shocks to the utility of leisure"
- Normally: "good" shock - efficient equilibrium changes in agents' preferences

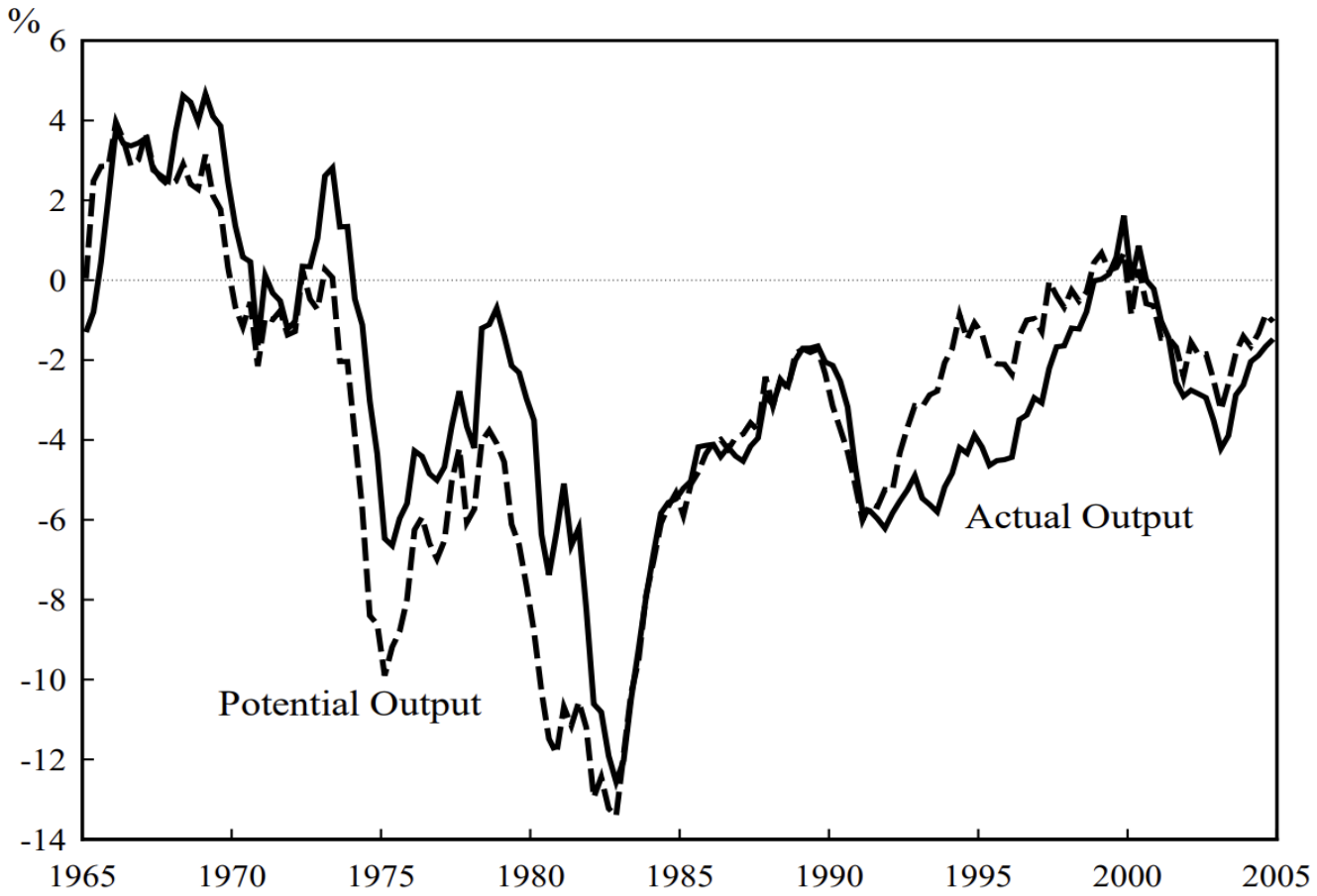
Multiple interpretations

Quantitatively: follow SW and predict the potential output of the economy under a taste shock

- Using AR taste shock and i.i.d. markup shock
- Then plot changes in the potential and actual output from 1965 to 2005 from this version of the model estimated for the United States
- Note: early 80s, potential output under actual output

Figure 3. U.S. Output and Potential Output in Version of Smets-Wouters (2007) Model with AR(1) Taste Shocks and i.i.d. Wage-Markup Shocks

Quarterly Percentage Changes, 1965–2005, Series Logged and Detrended



Source of Actual Data: See Smets and Wouters (2007).

Multiple interpretations

Implications:

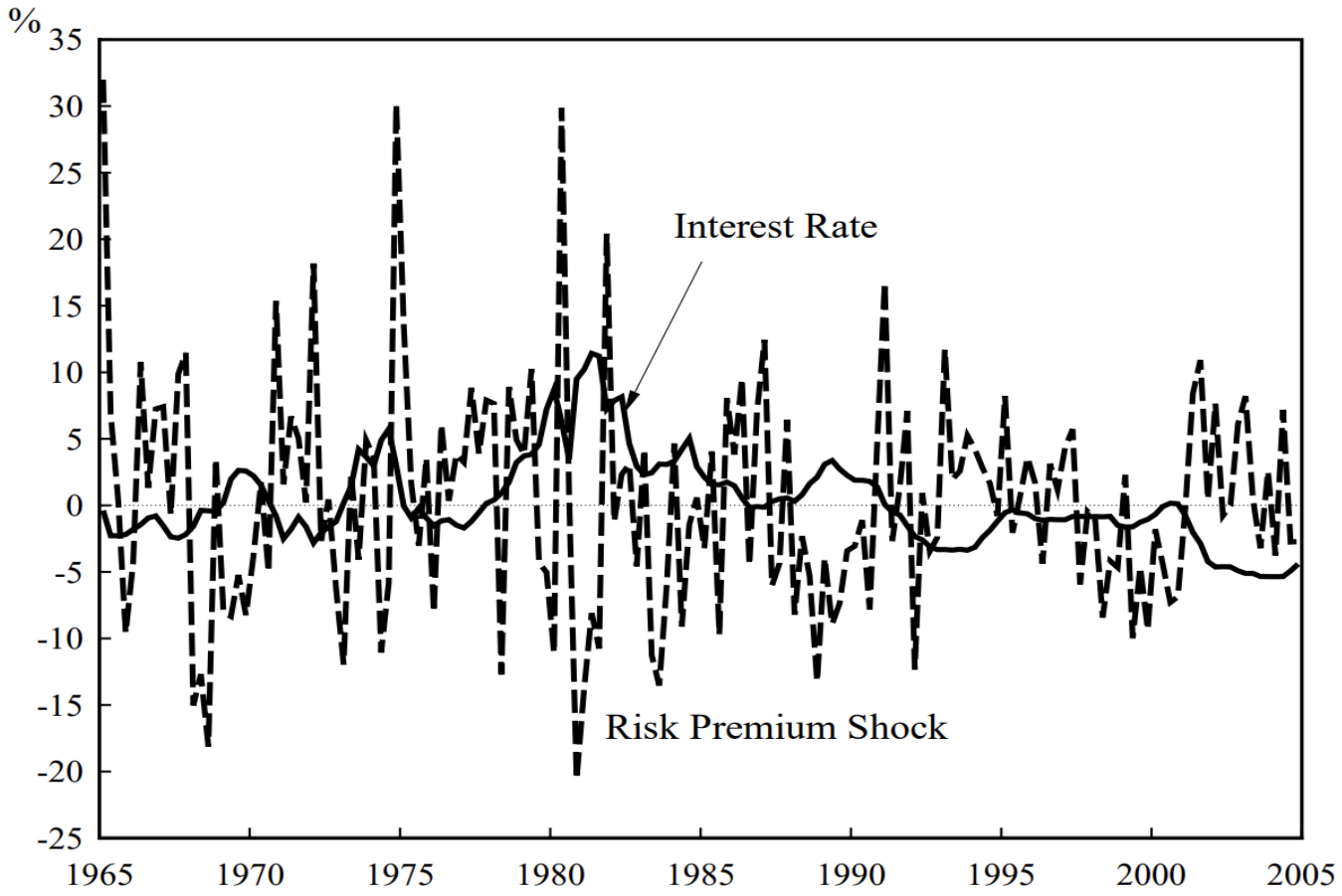
- "Severe attack of contagious laziness" as driving force behind postwar recessions (’79-’84), as opposed to monetary policy decisions
- Optimal policy: laissez-faire OR even more tighteing to discourage "vacation-taking"

Other (dubiously structural) shocks

- Price-markup shock: similar issues to wage-markup
- Exogenous/government spending
  - 3.5x the variance of measured government spending in US data
  - Incorporates in its definition variables like net exports, which are not likely to be invariant to monetary policy
- Risk premium shock
  - Resembles unobserved time-varying taxes on short-term nominal government debt
  - "Sensible" interpretation: captures flight to quality episodes in financial markets –> hardly invariant to monetary policy in that case

FIGURE 4. ANNUALIZED INTEREST RATE AND RISK PREMIUM SHOCK OF THE SMETS-WOUTERS (2007) MODEL

Quarterly 1965–2005, Series Demeaned



Source of Actual Data: See Smets and Wouters (2007).

Other "dubious" features

Backward indexation of prices :

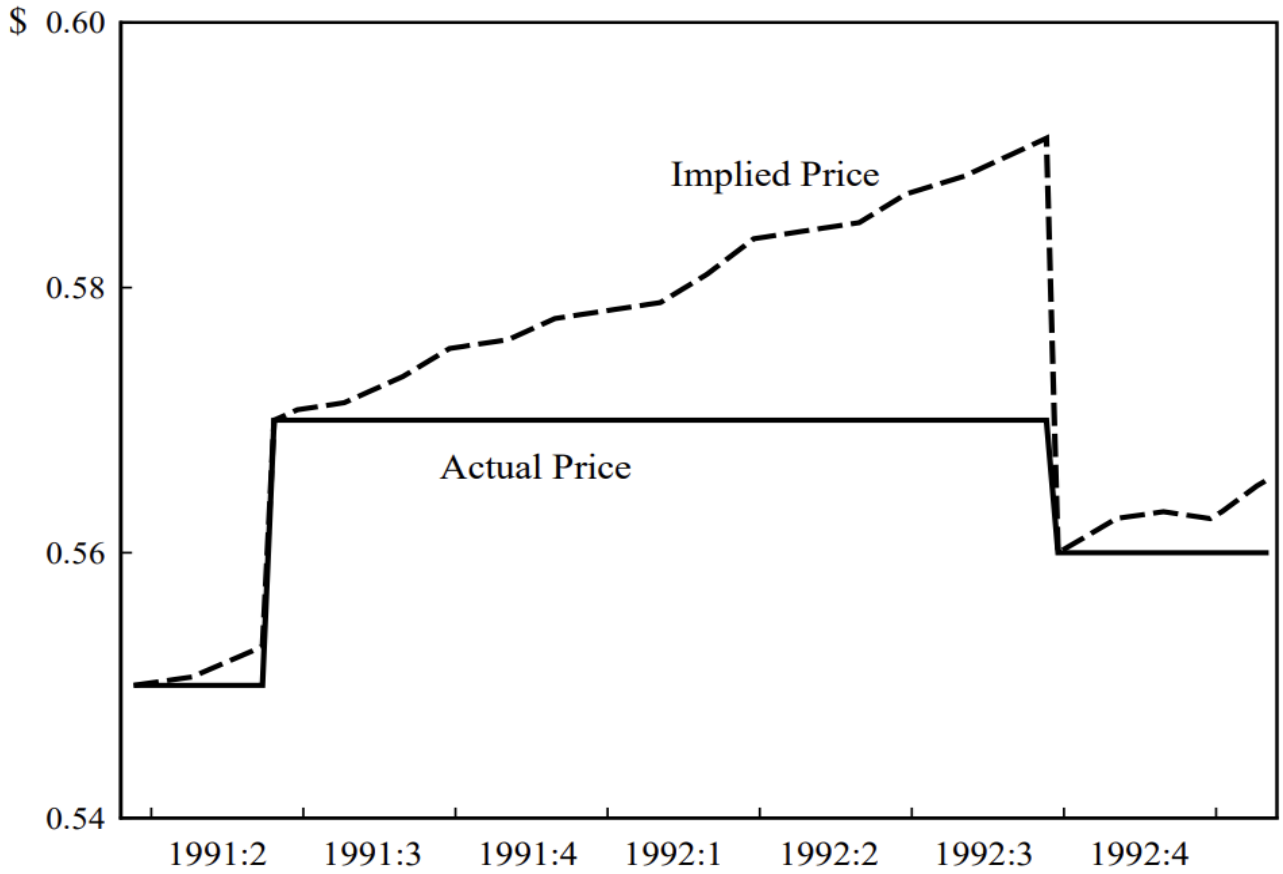
- Special Calvo wage and price-setting framework, where non-adjusting firms index their prices on lagged inflation :

$$p_{jt} = \pi_{t-1} p_{jt-1}$$

- Mechanism for generating persistent inflation
- Smets-Wouters (2007) assume partial indexation
- Inconsistent with microeconomic evidence on price-setting : *Mark Bils and Peter J. Klenow (2004), Mikhail Golosov and Robert Lucas (2007), Virgiliu Midrigan (2007), Emi Nakamura and Jón Steinsson (2008)*

FIGURE 5. PRICE OF ANGEL SOFT BATHROOM TISSUE AT CHICAGO'S DOMINICK'S FINER FOODS AND PRICE IMPLIED BY BACKWARD INDEXATION

Weekly, from Week 11 of 1991 to Week 5 of 1993



Source of Actual Data: University of Chicago, Kilts Center for Marketing

Micro-evidence:

- Bils and Klenow (2004): average time between price changes = 4 months
- Nakamura and Steinsson (2008) : close to 11 months
- Means that the price remains **fixed** during this interval.
- This contradicts backward indexation, where prices change every single period

This mechanism shapes policy advice : cost of disinflation are higher in an economy with backward indexation

Other dubious features

Monetary policy function

- NK models follow Taylor rule specification
  - Assumes that short-term interest rates are stationary and ergodic
  - Implies that long-term nominal rates are much smoother than in the data
  - Leads to misidentification of source of inflation persistence
- Micro-evidence and finance work show that Fed interest rate policy needs a random component
- Adding a random walk component to Fed policy function, the model needs no backward indexation of prices in order to fit the data. That model then fits the data better than the standard New Keynesian model with backward indexation and a Taylor rule (Cogley Sbordone (2005), Ireland (2007))

Discussion

Other research

Recommendations for further NK research:

- Abstain from adding free parameters - most flagrant issue of NK models
- Example: Fluctuations in the cross-sectional distribution of employment

Has been integrated by many ensuing variations of New Keynesian models

- Alovokpinhou et al. 2022 - incorporate backward indexation criticism
- Armenter et al. 2009 "Gaps and Monetary Policy" - structurality

Smets-Wouters direct response 2012

Acknowledgement of identification issue of wage markup shock and labour supply shock

- Overcome in reformulated SW model: unemployment rate used as observable variable (define unemployment as people who would like to be working and are not)
- In equation relating wage inflation to price inflation, the unemployment rate and the wage markup: error term captures only effect to wage markup and not preference shocks
- Preference shocks accounted for separately

Critique

- "[…]possibility that measured wedges are a product of mismeasurement" (Brinca, Costa-Filho, Loria 2020)
  - Over-reliance on what is measured could lead to capturing distortions that don't exist (shadow economy, intangible capital, etc.)
- Overall tone of paper very clearly biased in favour of neoclassical models
- Switching between SW and Christiano et al. 2006
- Notation inconsistencies, certain arguments repeated multiple times, whilst others remain underdeveloped (see price markup shock, critique on Taylor rule)

Conclusion

- Multiple non-structural aspects, most flagrant being the wage markup, as it accounts for most of fluctuations
- The New Keynesian wage markup is identical to the labour wedge developed in business cycle models
- Since the labour wedge is proved to be non-structural because of identification issues, then the wage-markup shock is non-structural
- Therefore cannot be used to analyse policy
  - Bargaining power interpretation -> bust unions
  - Value of leisure interpretation -> *laissez-faire*

Bibliography

Brinca, Pedro, João Ricardo Costa Filho and Francesca Loria. "Business cycle accounting: What have we learned so far?" Journal of Economic Surveys (2020)

Jordi Galí. "The Return of the Wage Phillips Curve." Social Science Research Network, 1 Feb. 2010, https://doi.org/10.3386/w15758.

Galí, Jordi, Frank Smets, and Rafael Wouters. "Unemployment in an Estimated New Keynesian Model." NBER Macroeconomics Annual 26, no. 1 (2012): 329–60. https://doi.org/10.1086/663994.