

## 6th Cambridge-Princeton Conference

# Discussion of Stepping on a Rake: The Role of Fiscal Policy in the Inflation of the 1970's by Christopher A Sims

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## Aims of the Paper

- “Fiscal policy underwent dramatic shifts in the 70’s and economic theory makes clear that in an environment of uncertainty about future fiscal policy, monetary policy instruments may lose potency or have perverse effects”
- “Documents the vagaries of fiscal policy in this period and argues that people at the time must have been uncertain about fiscal policy’s future course”
- “Theoretical framework for understanding the effects of fiscal uncertainties on monetary policy [showing] that the fiscal variables have predictive value in dynamic models, even if traditional monetary policy indicators are included in the system”



# Theory of Fiscal and Monetary Policy Interaction

- **Fiscal theory of the price level (FTPL)** equilibrium models with government budget constraints imply that inflation results when rational agents believe that **future taxes will not cover new government debt**
- Then policy **increases in interest rates exacerbate the inflation rate** and the rate of **expansion of nominal government debt increases**
- When **interest rates are high a major part of government spending is interest expense** and **interest rate increases accelerate** the rate of expansion of **nominal government debt**
- **Primary government surplus** is revenues minus expenditures *excluding* debt service and as a **proportion of** outstanding **government debt** should average in the long run to about the **real rate of return** in the economy



# Primary Deficit Evolution

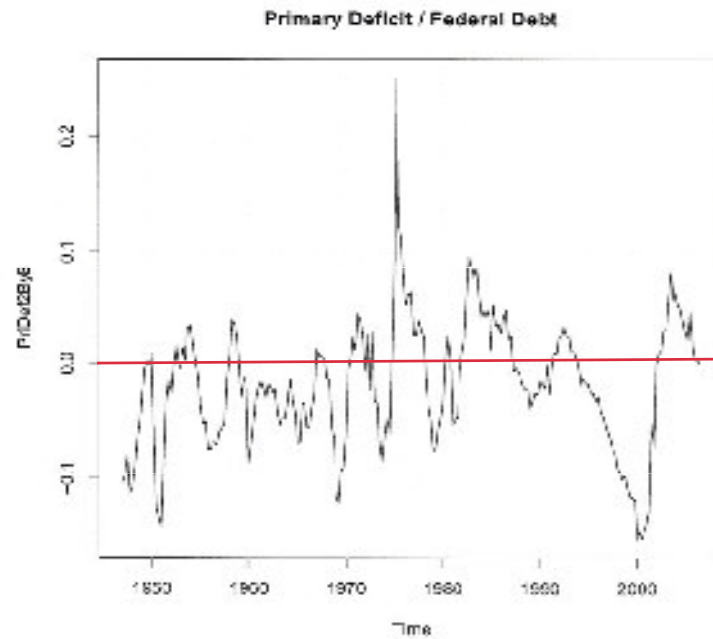


FIGURE 1.



# Two Dynamic Discrete Time Stochastic Macroeconomic Models

- Solvable flexible price model of an endowment economy with interest rate policy set by a Taylor rule, a government budget constraint and a simple fiscal policy rule in which **explosive equilibrium inflation dynamics depend on nominal consumption as a proportion of the money supply**
- FTPL flexible price model of a cashless economy with only (instantaneous) short government debt, a mean reverting monetary policy rule around a fixed real interest rate and a government budget constraint that has the rate of change of real government debt responding to real debt service, the exogenous primary surplus and the rate of change of nominal debt in which **explosive equilibrium dynamics and monetary policy contraction increasing inflation – stagflationary? – are both possible**



# New Keynesian Inertial Price FTPL Model

- New Keynesian model extending the FTPL model to **inertial prices** and **long (consol) government debt** with a Phillips curve and the rate of change of primary surplus responding to that of consumption in which **monetary contraction initially lowers inflation only to have it subsequently rise above its initial level** – the *“stepping on a rake phenomenon”*
- In this model **an expansionary fiscal policy creates a consumption boom and inflation while monetary policy responds by increasing the interest rate bring the boom and inflation to an end even though the price level has been permanently increased and the increased debt issued has been ultimately financed by inflation** – *a public policy induced business cycle?*
- However “it is unrealistic to suppose [as in this model] that people in general, and bond market participants in particular, had [in the 70’s] a stable, accurate view of fiscal policy, because the policy behavior was undergoing drastic shifts”
- When primary surplus over the market value of the debt is added to an (unspecified) VAR model the *“price puzzle”* – **an initial inflationary response to increased interest rates** – is eliminated although the primary deficit tends to *fall* which indicates **identification problems** with the model



# Interest Expense Evolution

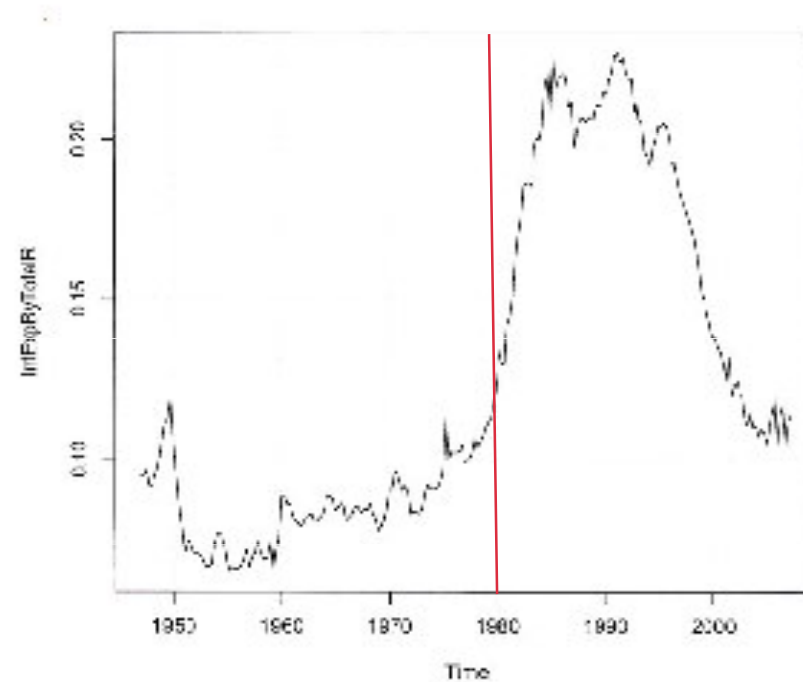


FIGURE 2. US Federal Government interest expense as proportion of total expenditures



# The Post-war Business Cycle

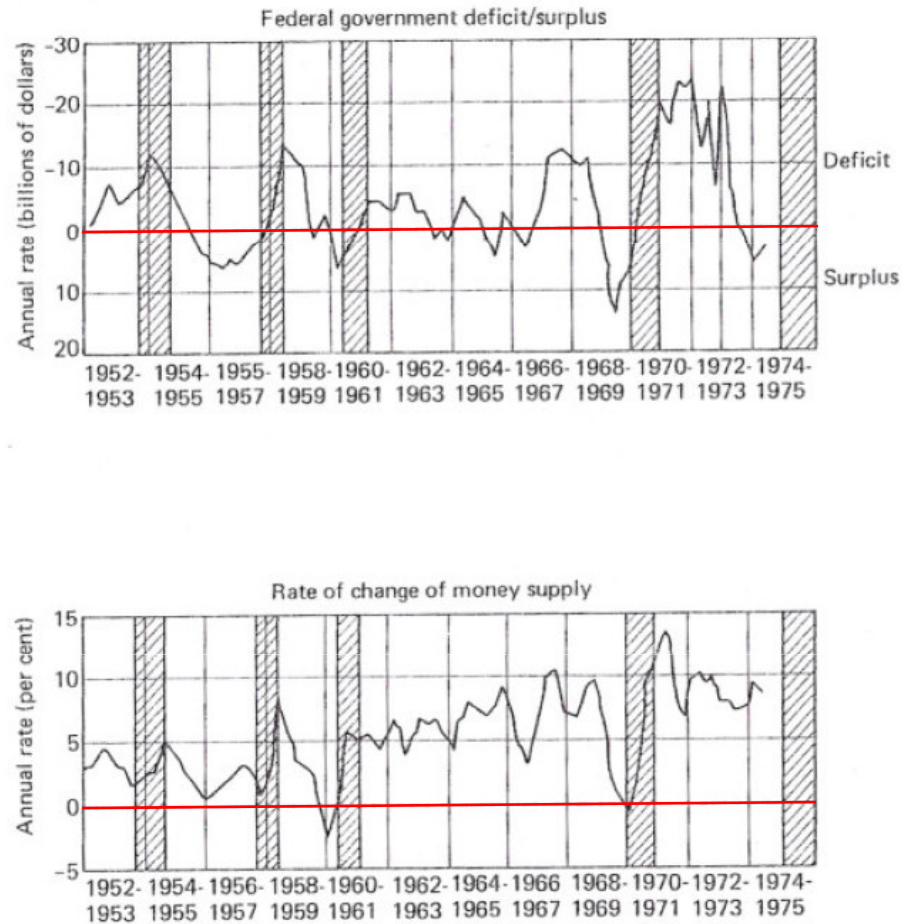


FIG. 13.1 The business cycle induced by public policy, federal deficits and easy money generate inflation, federal surplus and tight money generate recession (Periods of recession are shown shaded)



# Modelling the US Federal Spending Process

- NSF sponsored 20 year (1963-1982) econometric effort *before* unit root tests, co-integration and VECR dynamic models
- Micro models of **appropriation formation** for major agencies and departments in OMB divisions taking into account external economic, social and political influences operating through the Executive, President and Congress
- Models of **nonmarket coordinating mechanisms** used by OMB to fit agency requests within current fiscal constraints
- Distributed lag models of **agency spending** to represent the timing of actual agency outlays from appropriated funds



# Findings

- Davis, Dempster, Wildavsky, Crecine, Kamlett, Mowery, Niskanen, Galper, Wendell, ... encouraged by Simon, Buchanan, Modigliani and others
- An approximately **two year budget process** from **start to disbursement** characterised by agency mark up over previous year's appropriation, OMB proportional cut/surplus allocation for all but the most important agencies (e.g. DOD) and Congressional request mark down – to result in an **explosive incremental process requiring occasional major readjustment to keep on track**
- Significant **economic influences on the process** included budget deficit in the previous fiscal year, projected budget receipts ratio, recession, unemployment rate, real net national product per capita, GNP deflator and Federal/private price index ratio
- This suggested an **inertial fiscal reaction to economic variables to close macroeconomic models**



# Closed Macroeconomic Model of Momentary Equilibrium for Comparative Static Analysis

Dempster (1975) Davis & Dempster (1975) Dempster & Wildavsky (1979)

- Model explicitly attempts to represent at the macro level the **productive sector** of the economy, the **government expenditure** process, the behaviour of the **central banking** authorities and the private **banking sector**
- **Debt financing, open market operations, trade balance and foreign capital transfers influence real activity and inflation through the money and stock markets**
- The **six equations** determining **real output, investment, employment, profit, the price level and the interest rate** are analysed with respect to both **domestic policy** parameters and the effects of the **global economy as represented in the balance of payments and net foreign capital transfers**
- When the US Government has large deficits, it is very important how much of the new debt can be sold to the (US) public as government securities and how much must be sold to the Federal Reserve as debt which will then, eventually at least, find its way into the money supply



# Closed Static Macroeconomic Model

TABLE 13.4 A MACROECONOMIC MODEL WITH ENDOGENOUS GOVERNMENTAL AND PRODUCTIVE SECTORS

## Production

Production function:  $Y = f[(1 - \delta)K + I, N]$

Definition of profit:  $P\Pi = PY - rPI - w(P)N - r(1 - \delta)PK$  (1)

Investment equation:  $f_k(I, N) = r$  (2)

Employment equation:  $Pf_N(I, N) = w(P)$  (3)

## Expenditure

National income identity:

$$Y = c(Y - T, W) + I(r, P) + G + X/P + F/P$$
 (4)

Tax function:  $T = t(PY; \tau)/P$

Government expenditure:  $G = g(PY, U; \gamma)/P$

Government income identity:  $G = T + \Delta$  (5)

## Capital and Money Markets

Stock Market index:  $S = s(\Pi, Y, r, P; X, F)$

Definition of wealth:

$$W = [(1 - \delta)K + I] + \left(\frac{M}{P} + \mu v \Delta\right) + \left[(1 - \mu)v \Delta + \frac{B}{rP}\right]$$

Demand for money:

$$L = \tau(Y, W) + \eta(s)I = l(Y, r, P; X, F)$$

Supply of money:

$$M/P = m(r, P, v(1 - \mu)\Delta + \frac{B}{rP}, \mu\Delta, \lambda; F, \rho, R) = M(r, P, Y; \lambda, F)/P$$

Money market equilibrium:  $M(r, P, Y; \lambda, F)/P = l(Y, r, P; X, F)$  (6)

Source: Davis and Dempster (1975), op. cit.

Subscripts in (2) and (3) denote partial derivatives.

TABLE 13.5 PARAMETERS AND VARIABLES OF THE MACRO-ECONOMIC MODEL

Given:

- K – existing capital stock
- $\delta$  – rate of capital depreciation,
- $N_0$  – work force,
- X – net exports,
- F – net foreign capital transfers,
- $\tau$  – gross tax rate,
- $\gamma$  – level of government activity,
- $\Delta$  – real government deficit,
- $v$  – proportion of new government debt held domestically,
- $\mu$  – proportion of new government debt monetized,
- B – existing stock of government bonds,
- $\lambda$  – open market activity level,
- $\rho$  – rediscount rate,
- R – reserve requirement,

the six equations (1–6) of Table 13.4 determine the six variables:

1. I – real investment,
2. N – employment (or unemployment,  $U = N_0 - N$ ),
3. Y – real GNP,
4.  $\Pi$  – real profit,
5. r – interest rate,
6. P – price level (GNP deflator).



# Model Policy Parameters

- Gross **tax rate**  $\tau$
- Level of **government activity**  $\gamma$
- Real **government deficit**  $\Delta$
- **Open market activity**  $\lambda$
- Proportion of **new government debt monetised**  $\mu$
- Proportion of **new government debt held domestically**  $\nu$



# Model Comparative Statics

- Model **response to** changes in **policy parameters** can be classified into **four regimes**
- Regimes are **determined by the relative sizes of the marginal responses of real activity and the money market to changes in real output  $Y$ , the interest rate  $r$  and the price level  $P$**
- The **first** regime is the **classical** economy
- The **second** is either **Keynesian or stagflationary**
- The **third** is the classical **business cycle**
- The **fourth** is either Keynesian, when an increasing deficit leads to declining prices, **or again stagflationary**



# Public Policy Induced Economic Cycles Leading to the 1960-61, 1969-70 and 1974-75 Recessions

- **Beginning** as a response to recessionary conditions or through Presidential policy (Johnson in 1966) both **fiscal and monetary policy is strongly expansionary**
- This corresponds to **regime three** of the model when **real GNP, the price level and the interest rate move upward together** since effective marginal wage escalation due to collective bargaining is small while net marginal government impact – the **excess of government expenditure over receipts at the margin** – is **strongly positive**
- The second half of this phase in model regime three is characterised by **increasing inflation** due to the response of the price level to the effects of **expansionary fiscal and monetary policy** and to **accelerating wage claims**



- Effective **marginal wage escalation** is **increasing** while **net government impact** is **declining** due to the interaction of inflation with the progressive tax structure to raise tax take relative to less rapidly expanding government expenditures to **eventually** produce a **Federal budget surplus**
- These stringent fiscal policy measures are **reinforced by a contraction of the money supply** (1960, 1969, 1974)
- By this time exaggerated wage claims justified by inflation have **escalated wages** while the increment of **tax take over** that of **nominal government spending** has **increased**
- These are the conditions of **model regime four** in which the marginal response of the price level to contractionary fiscal or monetary policy is **positive** (*ignoring international trade and capital transfers*) to result in **stagflation** – a simultaneous decline in real activity, increased interest rates and continuing inflation

