IS THE MONETARIST ARITHMETIC UNPLEASANT?

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“Some Unpleasant Monetarist Arithmetic” !

Sargent and Wallace (1981)

‘tighter money now can mean higher inflation eventually.’

- A model with a policy regime characterized by fiscal dominance.
- An exogenous path for real primary deficits, which must be passively finance by either printing money or issuing debt.

Tightening current monetary conditions requires increasing the growth of interest-bearing debt;

eventually, the government has to increase the money supply to pay not only for the primary deficits but also for the increase debt and accumulated interest.

Is there any alternative optimal policy?

Under what circumstances, if any, postponing inflation by failing to fully monetize the fiscal deficit can indeed be the optimal policy choice?

Sargent’s and Wallace’s analysis is purely positive and void of explicit normative predictions!

what is the welfare maximizing monetary policy in a fiscally dominant regime?

A comparable model

- The fiscal authority sets an exogenous path for the primary fiscal deficit,
- The central bank is limited to choosing the mix of money creation and debt issuance.
- Failing to monetize the fiscal deficit does result in higher inflation eventually, exactly as dictated by the unpleasant monetarist arithmetic.

The key departure:

The central bank chooses a monetary policy that maximizes the lifetime utility of the representative household.

Result

Whether or not in a fiscally dominant regime it is optimal to delay inflation by issuing debt depends on *the expected path of fiscal deficits*.

- Fiscal deficits are expected to decline: it may be optimal for the central bank to fall short of full monetization of the fiscal deficit.
- Fiscal deficits are expected to grow over time: it may be optimal for the central bank to follow a monetary policy that is looser than the full monetization of the fiscal deficit would require.
- Fiscal deficit is expected to be stable over time: Full monetization of the fiscal deficit emerges as the optimal policy outcome.

Intuition

- Inflation represents a distortion.
- Smoothing this distortion over time can be welfare increasing.
- Tending to set a smooth path of inflation subject to cover the lifetime liabilities of the government with seignorage.
- The optimal inflation rate is dictated by the average fiscal deficit, rather than by the current one.
- If the current fiscal deficit is above its average value, seignorage will fall short of the fiscal deficit, and the government will need to issue debt to close the gap.
- This expansion in government liabilities implies higher future inflation than the alternative of printing money today to pay for the entire current fiscal deficit but is preferable because it renders a smoother path for the inflation tax.

The Model

Households

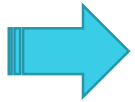
$$\int_0^\infty e^{-\rho t}[u(c_t) + v(m_t)]dt,$$

$$c_t + \dot{m}_t + \pi_t m_t + \dot{b}_t + \pi_t b_t = y + \tau_t + i_t b_t,$$

$$w_t \equiv m_t + b_t \qquad r_t \equiv i_t - \pi_t$$

$$c_t + \dot{w}_t = y + \tau_t + r_t w_t - i_t m_t.$$

$$\lim_{t\to\infty} e^{-R_t} w_t \geq 0,$$



$$u'(c_t) = \lambda_t,$$

$$\frac{v'(m_t)}{u'(c_t)} = i_t,$$

$$\frac{\dot{\lambda}_t}{\lambda_t} = \rho - r_t,$$

$$c_t + \dot{w}_t = y + \tau_t + r_t w_t - i_t m_t,$$

$$\lim_{t\to\infty} e^{-R_t} w_t = 0.$$

The Government

$$\dot{w}_t = \tau_t + r_t w_t - i_t m_t.$$

$$m_t = L(i_t, c_t),$$

Competitive Equilibrium

$$c_t = y,$$

$$m_t = L(i_t, y).$$

$$r_t = \rho.$$

$$\frac{B_0 + M_0}{P_0} = \int_0^\infty e^{-\rho t}[i_t L(i_t, y) - \tau_t]dt,$$

Definition 1 (Competitive Equilibrium) *A competitive equilibrium is an initial price level P_0 and a time path of nominal interest rates $\{i_t\}$ satisfying equation (12), given the initial level of nominal government liabilities $B_0 + M_0$ and the time path of real primary fiscal deficits $\{\tau_t\}$.*

Ramsey Optimal Central Bank Policy

$$\int_0^\infty e^{-\rho t}[u(y) + v(L(i_t, y))]dt. \qquad \text{S.T} \qquad \frac{B_0 + M_0}{P_0} = \int_0^\infty e^{-\rho t}[i_t L(i_t, y) - \tau_t]dt,$$

Definition 2 (Ramsey Optimal Equilibrium) *A Ramsey optimal equilibrium is a path for the nominal interest rate* $\{i_t\}$ *that maximizes the indirect utility function* (15) *subject to the intertemporal constraint* (12)*, given the initial level of real government liabilities* $(B_0 + M_0)/P_0$ *and the path of primary fiscal deficits* $\{\tau_t\}$.

$$v'(L(i_t, y))L_1(i_t, y) + \eta[L(i_t, y) + i_t L_1(i_t, y)] = 0,$$

$$i_t = i^*,$$

$$\pi_t = \pi^* \equiv i^* - \rho,$$

$$m_t = m^* \equiv L(i^*, y),$$

Optimal Public Debt Dynamics

The government flow budget constraint: $\dot{b}_t = \rho b_t + \tau_t - \pi^* m^*,$

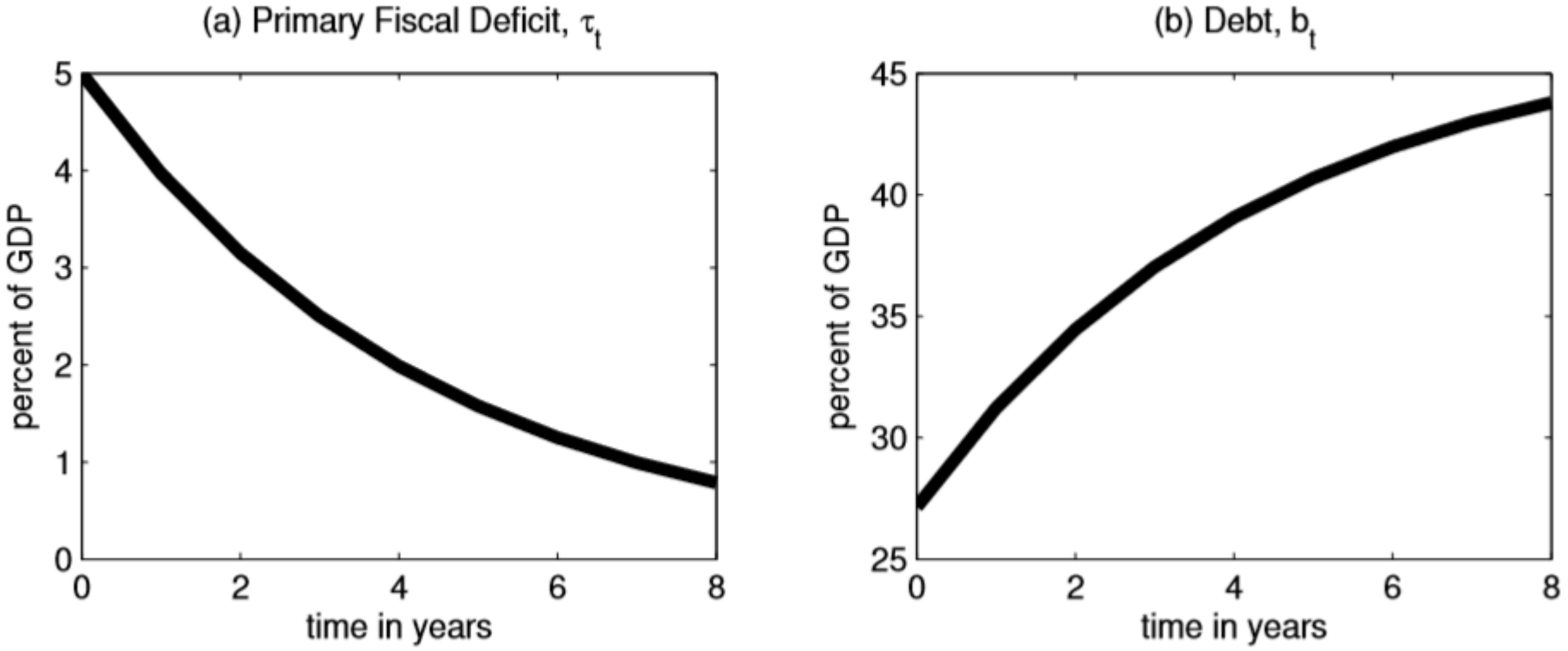
Decreasing path for budget deficit: $\dot{\tau}_t = -\delta \tau_t,$

$$\dot{b}_t = \rho b_t + \tau_0 e^{-\delta t} - \pi^* m^*,$$

$$b_t = \frac{\pi^* m^*}{\rho} - \frac{\tau_0}{\rho + \delta} e^{-\delta t}.$$

A Numerical Illustration

Figure 1: Ramsey Optimal Debt Dynamics



A Numerical Illustration

Ramsey Optimal Long-Run Debt, Inflation, and Seignorage as Revenue Functions of the Initial Level and Half Life of the Primary Fiscal Deficit

Half Life of Deficit	Initial Deficit τ_0	Long-run Debt b_8	Inflation Rate π^*	Seignorage Revenue $\pi^* m^*$
2.00	4.00	37.03	4.91	0.59
2.00	5.00	39.67	5.48	0.65
2.00	6.00	42.30	6.05	0.72
3.00	4.00	40.35	5.95	0.71
3.00	5.00	43.80	6.80	0.80
3.00	6.00	47.24	7.65	0.89
4.00	4.00	42.54	6.96	0.82
4.00	5.00	46.52	8.07	0.93
4.00	6.00	50.49	9.19	1.05

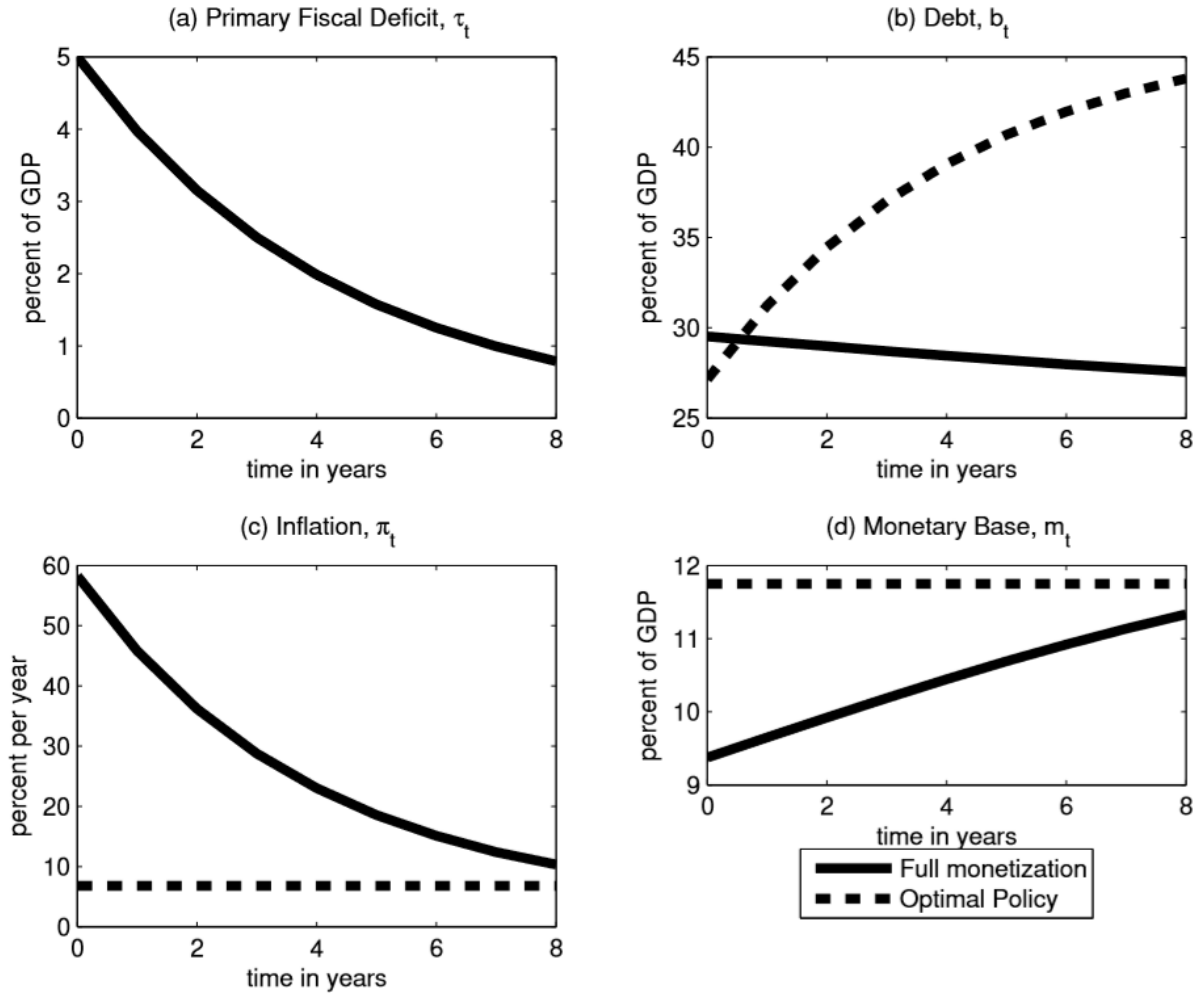
Optimal Policy Versus Full Monetization

setting $\dot{w}_t = 0$, we can rewrite the central bank's flow budget constraint as:

$$i_t L(i_t, y) = \tilde{\tau}_0 e^{-\delta t} + (\tilde{\rho} - g)\tilde{w}_0.$$

$$i_t = \left(\frac{\tau_0 e^{-\delta t} + (\tilde{\rho} - g)\tilde{w}_0}{A} \right)^{\frac{1}{1-\alpha}}$$

Optimal Policy Versus Full Monetization



THANK YOU