

Price Stability and Debt Stability: A Wicksell-Lerner-Tinbergen Framework for Macroeconomic Policy

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September 22, 2014

Introduction

- ▶ Debate: Is ability to reach full employment through fiscal deficits constrained by public debt sustainability?
- ▶ Debate about definition of sustainability.
- ▶ One useful definition of sustainable debt: **stable debt-GDP ratio**
 - ▶ Question: Does expansionary fiscal policy imply spiraling debt-GDP ratio?
 - ▶ Answer: No. (Sometimes requires debt-GDP ratio to converge to higher, but finite, level).
- ▶ Why? Interest rate *and* deficits affect debt-trajectory

Aim: Framework

- ▶ Framework: Wicksellian “natural interest rate” (zero output gap) and “sustainable budget balance” (constant debt-GDP ratio) are jointly determined. Unique (r, b) combination that assures both.
- ▶ First best: Coordination of Monetary and Fiscal Policy to achieve this.
- ▶ But political preference for independence-so different 'portfolios'

Aim: Dynamics of Adjustment to Sustainable Equilibrium

- ▶ Tinbergen issue: we have two instruments (interest rate and budget balance) and two targets (constant debt ratio and full employment/price stability).
- ▶ “Sound finance” rule assigns interest rate to output gap and budget balance to debt-GDP ratio. “Functional finance” rule has opposite assignment.
- ▶ In principle, assignment makes no difference. Both imply identical equilibrium values for interest rate and budget balance.
- ▶ But in practice, ‘wrong’ assignment can amplify shocks, creating endogenous “policy cycles” or divergence

Aim: Historical Calibration and Measurement

- ▶ Estimate the interest rate - budget balance combination consistent with constant debt ratio and zero output gap for the US historically (Proof of Concept).
- ▶ Propose explicit reporting of policy-relevant demand parameters and the implied historical changes in autonomous private demand

Policy Goals: Price Stability or Full Employment

Standard assumptions of textbook macroeconomics, used in all practical forecasting models:

- ▶ There is a well-defined level of potential output
 - ▶ Goal of macro policy-minimize “output gap”
 - ▶ Keeping output at potential encompasses goals of both price stability and full employment
- ▶ Current output is a negative function of the interest rate and a positive function of government deficits
- ▶ Private demand (including the trade balance) varies over time

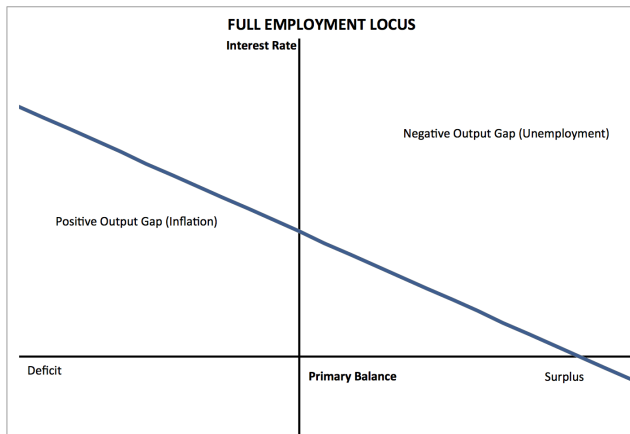
IS equation

$$y = z - \eta i - \gamma b + \tau id \quad (1)$$

Implies linear combinations of interest rate and budget balance compatible with price stability – for each fiscal surplus or deficit, there is a different “natural” interest rate

- ▶ y : output gap, as percent of potential output
- ▶ z : output gap when interest rate and primary deficit are zero
- ▶ i : interest rate (average rate on government debt)
- ▶ b : primary budget surplus
- ▶ d : debt-GDP ratio
- ▶ γ : average multiplier on government spending and taxes
- ▶ η : percent change in GDP from one point change in i
- ▶ τ : multiplier on interest payments on public debt

Price stability or Full Employment Locus



Policy Goals: Debt Stability

- ▶ Strong definition of sustainability: debt-GDP ratio cannot rise from current level
- ▶ By definition, ensures that ratio will not rise above any critical threshold
- ▶ Analysis would be the same if we instead required debt ratio to fall (or rise) by fixed percent of GDP each period

DS equation

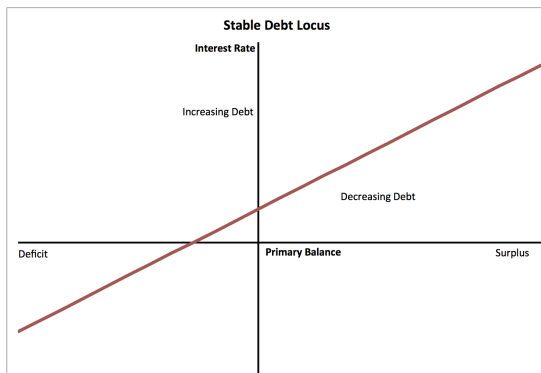
“Least Controversial Equation in Macroeconomics”: change in debt-GDP ratio is depends on i interest, b budget balance and g , GDP growth rate. Debt can reduced by raising b or lowering i (historically both)

$$\Delta d = \frac{i - g}{1 + g} d - b \quad (2)$$

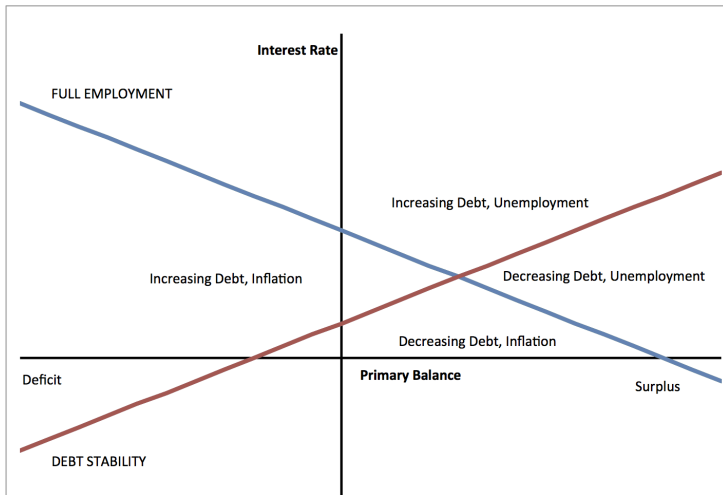
g : growth rate of GDP

$\Delta d = 0$ satisfied by linear combinations of i and b . For every interest rate, there is a different sustainable budget balance

Debt Stability Locus

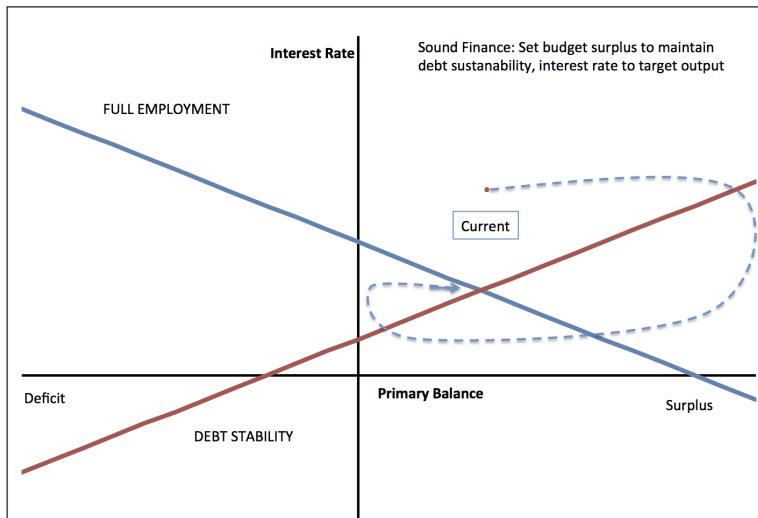


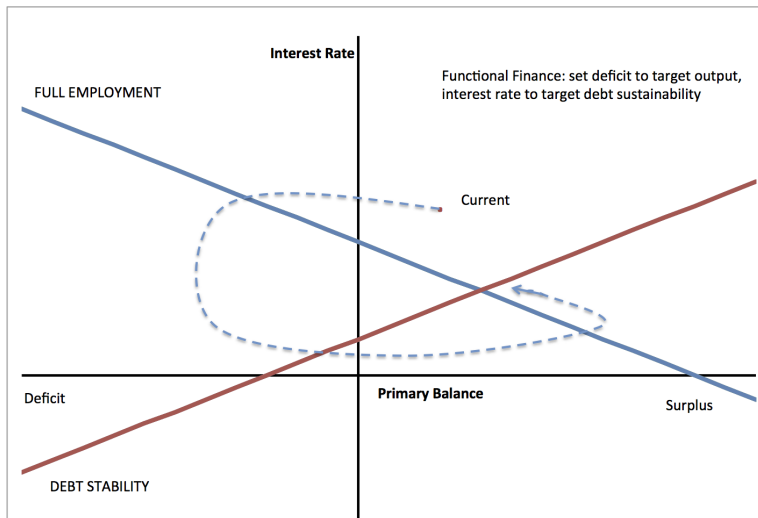
IS curve and law of motion of government debt together define unique combination of fiscal balance and interest rate with output at potential and constant debt-GDP ratio:



Tinbergen and assignment of rules

- ▶ Sound Finance:
 - ▶ Interest rate \implies output gap
 - ▶ Budget balance \implies debt stability
- ▶ 'Functional' Finance:
 - ▶ Interest rate \implies debt stability
 - ▶ Budget balance \implies output gap
- ▶ Sound finance = moving *vertically* toward potential output locus and *horizontally* toward debt stability locus.
- ▶ Functional finance = moving *horizontally* toward potential output locus and *vertically* toward debt stability locus.
- ▶ Adjusting each instrument independently based on its own target can produce cycles in interest rate-fiscal balance space. Dynamics matter!





Feedback effects in Policy Space

Intuition:

- ▶ Raising interest rate to eliminate a positive output gap increases interest burden of government debt, requiring higher taxes or lower expenditure to keep debt ratio stable.
- ▶ Moving the fiscal balance toward surplus to stabilize the debt ratio reduces demand, requiring lower interest rate to keep output at potential.
- ▶ A lower interest rate implies slower growth in the debt ratio, encouraging spending increases or tax cuts.
- ▶ As fiscal balance moves toward deficit, demand increases, requiring higher interest rate to keep output at potential.

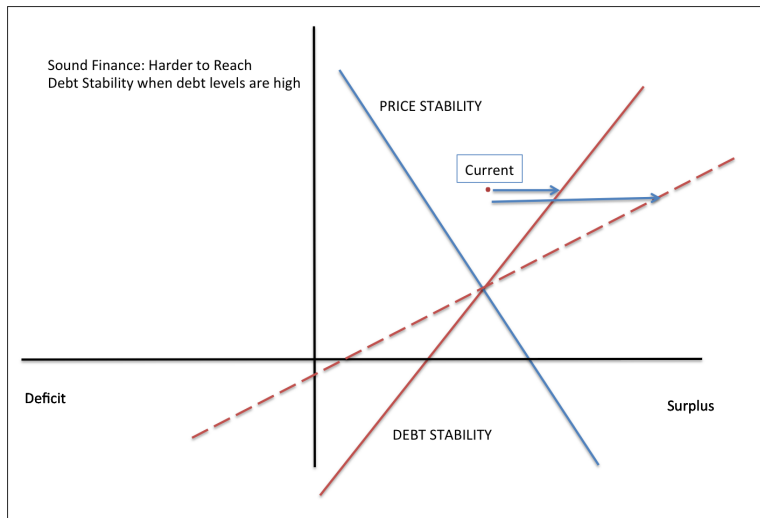
Convergence or Divergence?

- ▶ Whether these cycles converge or diverge depends on the parameter values and the level of debt.
- ▶ Sound finance converges most quickly when η is large, γ and τ are small, and the debt ratio d is low.
- ▶ Functional finance converges most quickly when γ is large, η is small, and the debt ratio d is high.
- ▶ For plausible parameter values (e.g. from FRBUS model), critical value of d for sound finance to converge is between 0.5 and 1.

Implication of stability analysis: when debt ratio is high, to avoid explosive policy cycles budget balance must target output gap and interest rate must target debt stability.

Fiscal space metaphor is backwards!

- ▶ At high debt ratios, change in debt ratio depends relatively more on interest rate, and relatively less on current spending and taxes.
- ▶ Historically, interest rate policy has focused on public debt rather than output when debt ratios were high.
 - ▶ World War II-era US
 - ▶ “Financial repression” (Reinhart et al.)

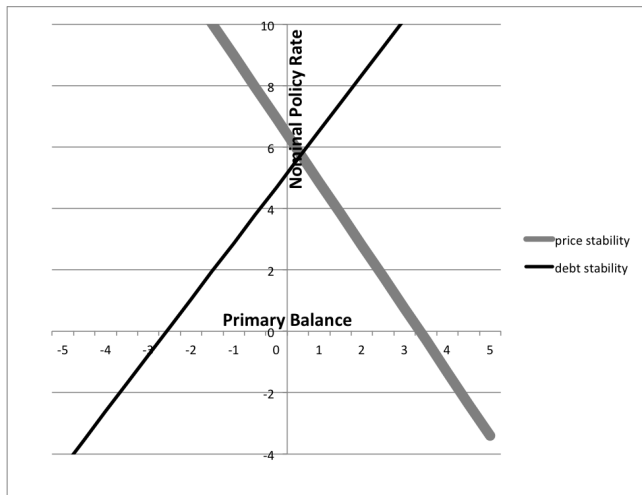


Locating the PS and DS Loci Historically

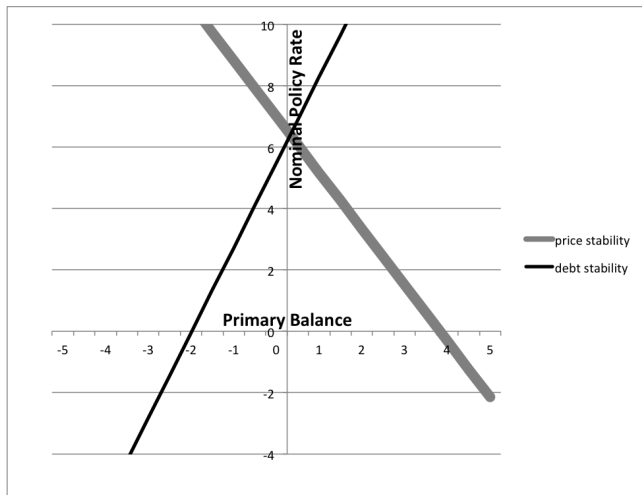
We estimate PS and DS loci by decade, on following assumptions (proof of concept):

- ▶ Output gap measured as deviation from BEA “potential output” trend (other useful measures behave similarly)
- ▶ Given output gap and trade balance plus chosen values of γ , η and τ , can calculate state of private demand as a residual
- ▶ Nominal interest rate measured as average rate on federal debt
- ▶ Interest rate that matters for private demand is nominal rate minus $0.5 \times$ observed inflation.
 - ▶ Even with strong assumptions of forward-looking, rational transactors this parameter should be less than 1
- ▶ Net exports add to final demand one for one.
- ▶ Parameter values: $\gamma = 1.5$, $\eta = 1$, $\tau = 0.5$ (typical from forecasting models)

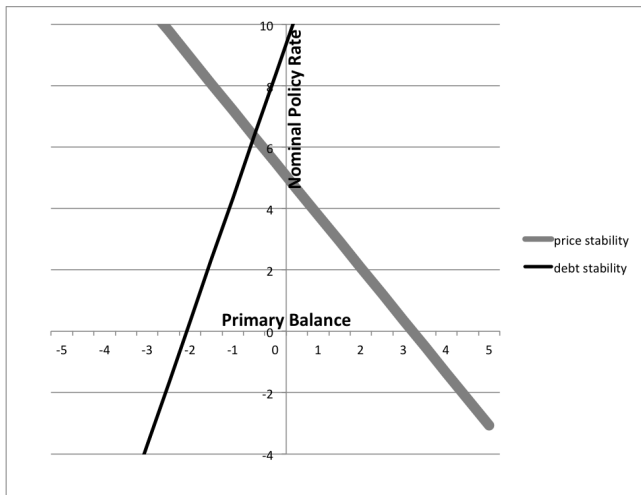
Price Stability and Debt Stability Loci, 1950s



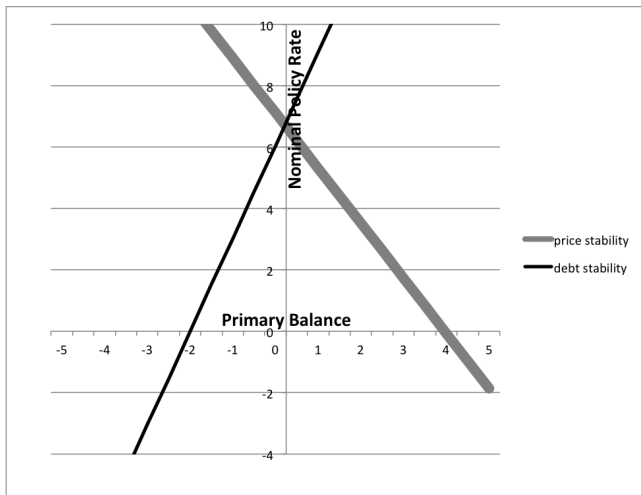
Price Stability and Debt Stability Loci, 1960s



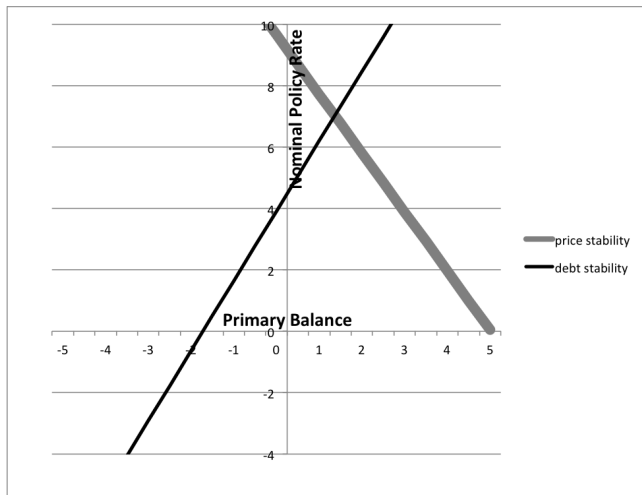
Price Stability and Debt Stability Loci, 1970s



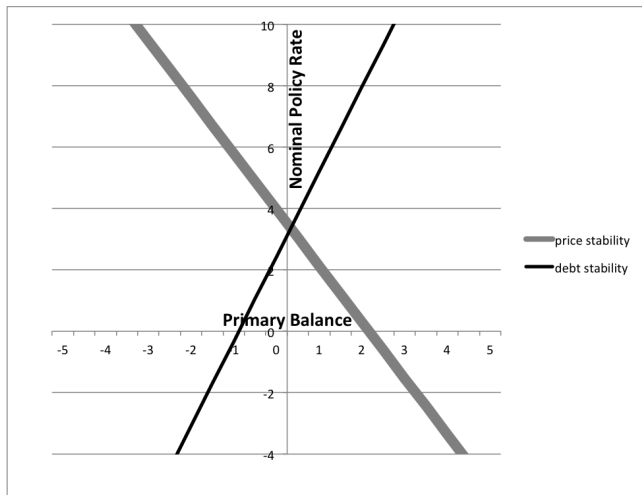
Price Stability and Debt Stability Loci, 1980s



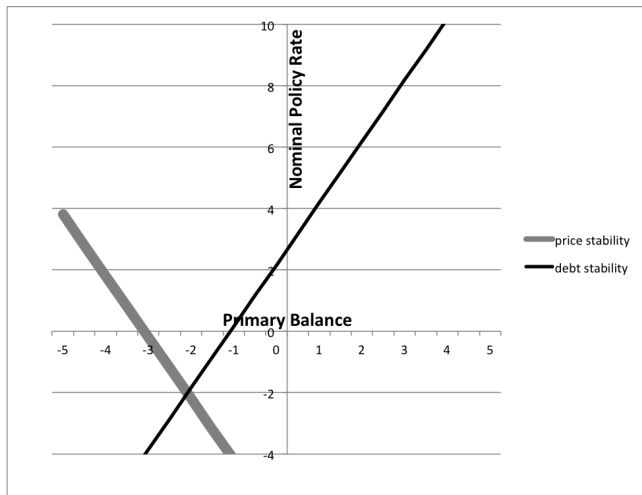
Price Stability and Debt Stability Loci, 1990s



Price Stability and Debt Stability Loci, 2000s



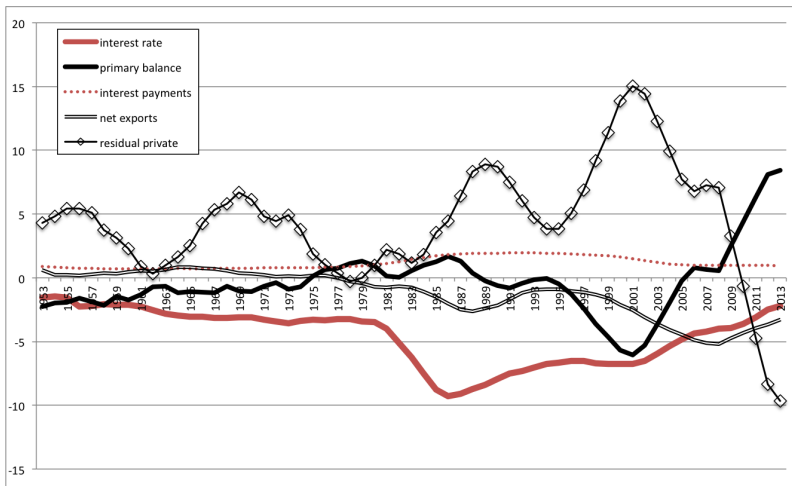
Price Stability and Debt Stability Loci, 2004-2013



Historical Estimates as Model Validation

- ▶ Any forecasting model uses certain parameter values. In combination with historical data, these values imply certain path for autonomous private demand.
 - ▶ “Autonomous” here meaning independent of fiscal and monetary policy.
- ▶ Should present this path explicitly – ask, what combinations of fiscal and monetary policy would have been required to eliminate output gap in different periods historically?
- ▶ Important because:
 1. Tool for model validation – are implied variations in private demand consistent with everything else we know about economy?
 2. Historical variations in private demand informative about range of variation policy will have to respond to in future.

Implied Contributions to Demand



Contributions to Output Gap in Percent of GDP, 5-Year Moving Averages

The current situation

- ▶ Sharp fall in private demand after 2008 implied by appearance of substantial negative output gap despite increase in demand from other sources
 - ▶ Lower net imports: +2 points
 - ▶ Lower interest rates: +3 points
 - ▶ Shift toward primary deficit: +7 points
- ▶ Movement of private demand of 15-20 points in just a few years seem hard to offset with either monetary or fiscal policy
 - ▶ Implies that macro stabilization needs to focus on underlying shifts of private demand

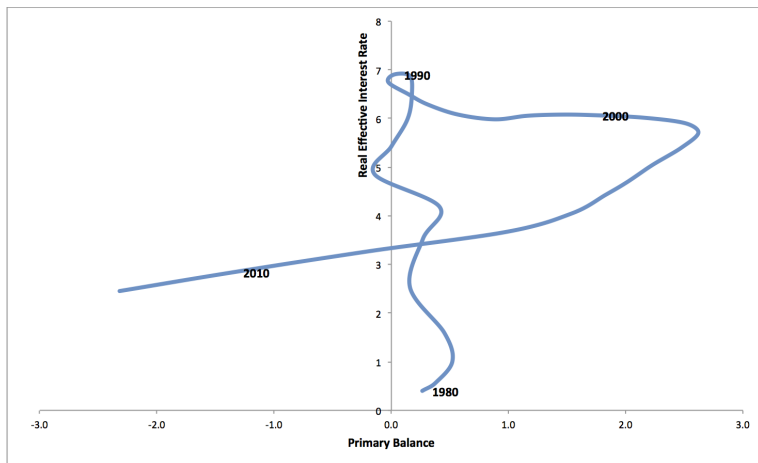
Improving Macroeconomic Data

- ▶ Participants in macro policy debates should give explicit parameter estimates
 - ▶ Many published estimates of fiscal multipliers, relatively few of output-interest rate sensitivity
- ▶ Any set of parameter values imply certain historical fluctuations in private demand. Forecasters should compute & publish these
- ▶ Validation of parameter estimates – timing or size of implied demand shifts may not be plausible
- ▶ Better estimates of historical demand fluctuations helps establish if existing policy tools will be adequate in the future
- ▶ Private forecasters and/or national statistical agencies should provide estimates of interest rates and budget balances needed to reach targets.

Conclusions

- ▶ Need to better define 'debt sustainability'. No increase from current debt-GDP ratio is one plausible definition
- ▶ Debt sustainability in this sense is not generally a constraint on active fiscal policy
 - ▶ If fiscal policy targets output and monetary policy targets debt ratio, will normally keep output at potential and debt ratio constant
 - ▶ If private demand is very weak and inflation and growth are low (as now), neither "sound finance" nor "functional finance" rule can achieve both targets
- ▶ With each instrument committed to one target, will see endogenous "policy cycles." Magnitude of cycles depends on parameters and current debt ratio
- ▶ Important to have consistent historical accounting for demand shifts given chosen parameters

A 40-Year Sound Finance Spiral?



10-Year Moving Averages, US i and b

- ▶ 1970s: Debt stable, positive output gap
- ▶ Interest increase moves economy toward price stability locus but off debt sustainability locus
 - ▶ Increased debt under Reagan due mostly (60 - 80%) to higher i , not primary deficits!
- ▶ Rising debt leads to primary surplus in 1990s. Reaches debt-sustainability locus, moves off price-stability locus.
- ▶ Primary surplus under Clinton \implies negative output gap; initially masked by tech boom.
 - ▶ Shift towards surpluses \implies lower i required for potential output (near zero 2000, zero in 2008)
 - ▶ Standard estimates of multiplier, interest elasticity of output suggest Clinton surpluses reduced “natural rate” by 5 points.