The Fiscal Theory of the Price Level in Overlapping Generations Models

Czech National Bank, May 17nd 2019

By

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2. IMF. This paper does not represent the views of the IMF.

Plan of Talk

- What is indeterminacy and why does it matter?
- What is the Fiscal Theory of the Price Level?
- How is the FTPL related to good monetary policy?
- What should central banks do?

What is Determinacy

- Determinacy means that all prices and quantities are fully determined by economic fundamentals
- For determinacy: we need as many unstable roots as free initial conditions (Blanchard-Kahn)

Determinacy

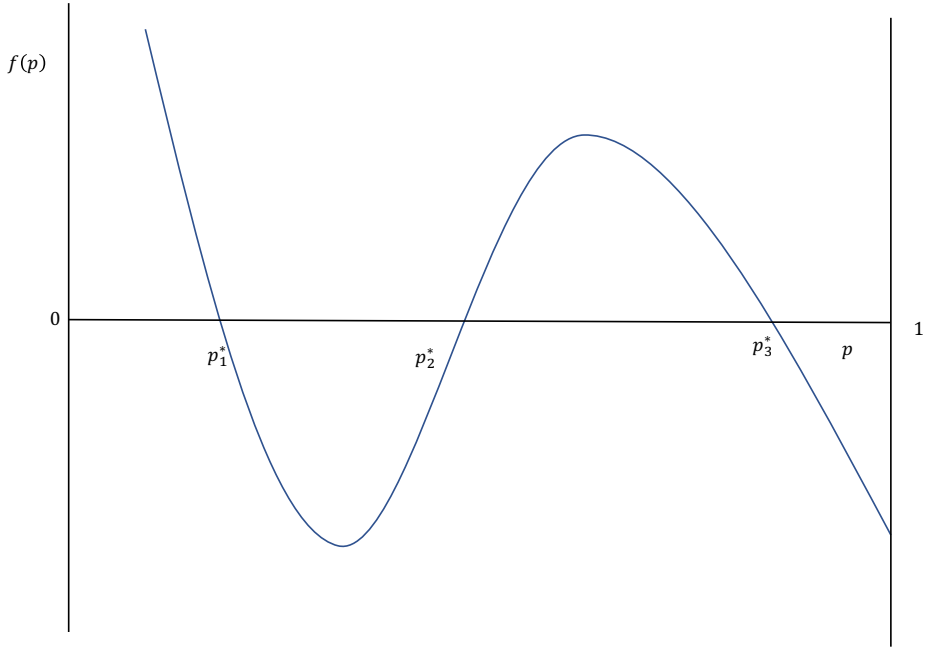


Figure 1: Three Equilibria in a Two-Good Model

Three equilibria in a finite general equilibrium model

Determinacy

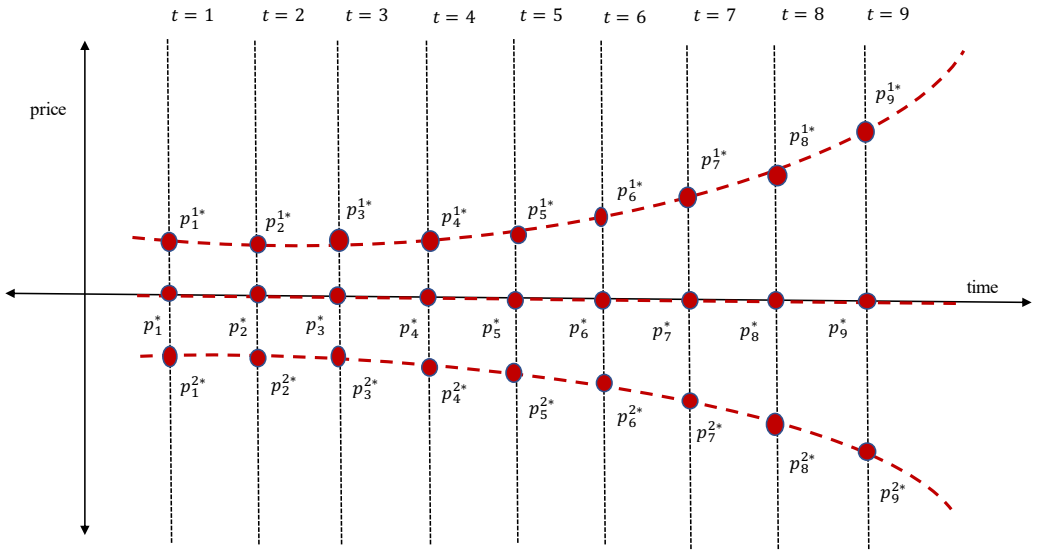


Figure 2: A Unique Determinate Equilibrium in an Infinite Horizon Model

A determinate steady-state equilibrium in an infinite horizon general equilibrium model

Indeterminacy

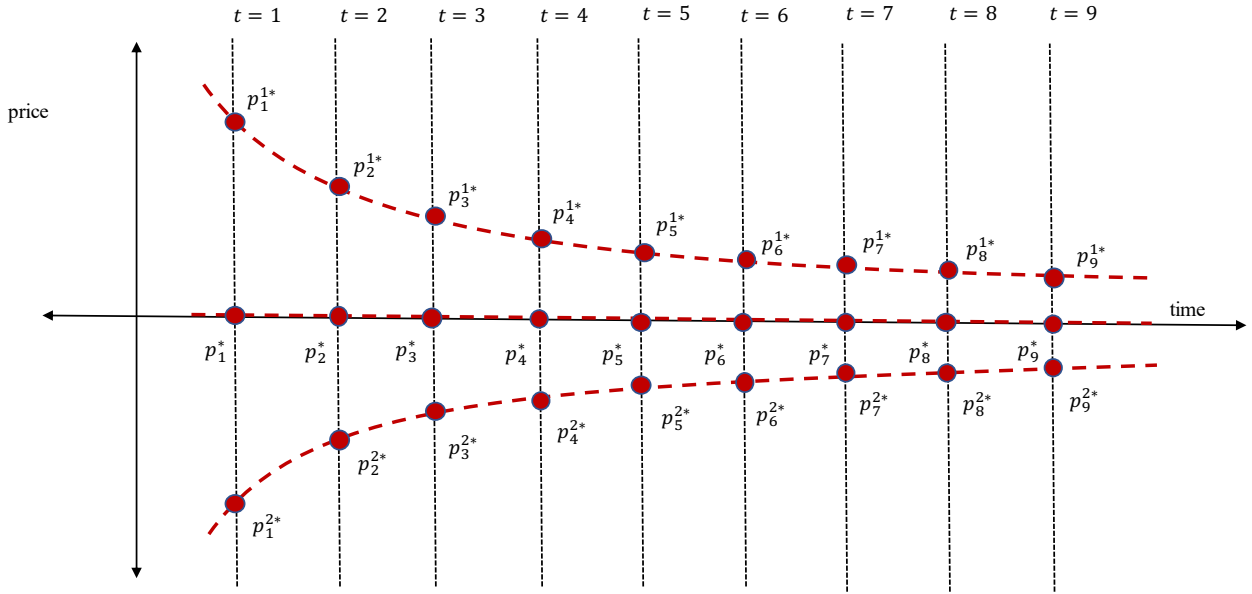


Figure 3: A Set of Indeterminate Equilibria in an Infinite Horizon Model

An indeterminate steady-state equilibrium in an infinite horizon general equilibrium model

What is the FTPL?

- In OLG models, or in any model with money, equilibria are often indeterminate
- If monetary policy pegs the interest rate, the price level is indeterminate
- A solution, in the NK model, is for fiscal policy-makers to ignore fiscal constraints

What is the FTPL?

- Is this a budget constraint or a debt-valuation equation?

$$\frac{B_0}{p_1} \leq -\sum_{t=1}^{\infty} Q_1^t d_t$$

Discounted present value of future budget surpluses

Main point: Is this equation true for all values of p_1 and $\mathfrak{Q}$?

A T-Period Lived OLG Model

- In the OLG model there are always at least two steady state equilibria (Kehoe-Levine 1985)
- There are generically, equilibria that are indeterminate of arbitrary degree
- CLAIM
- This is not a theoretical curiosity: it is an accurate description of the world

A T-Period Lived OLG Model

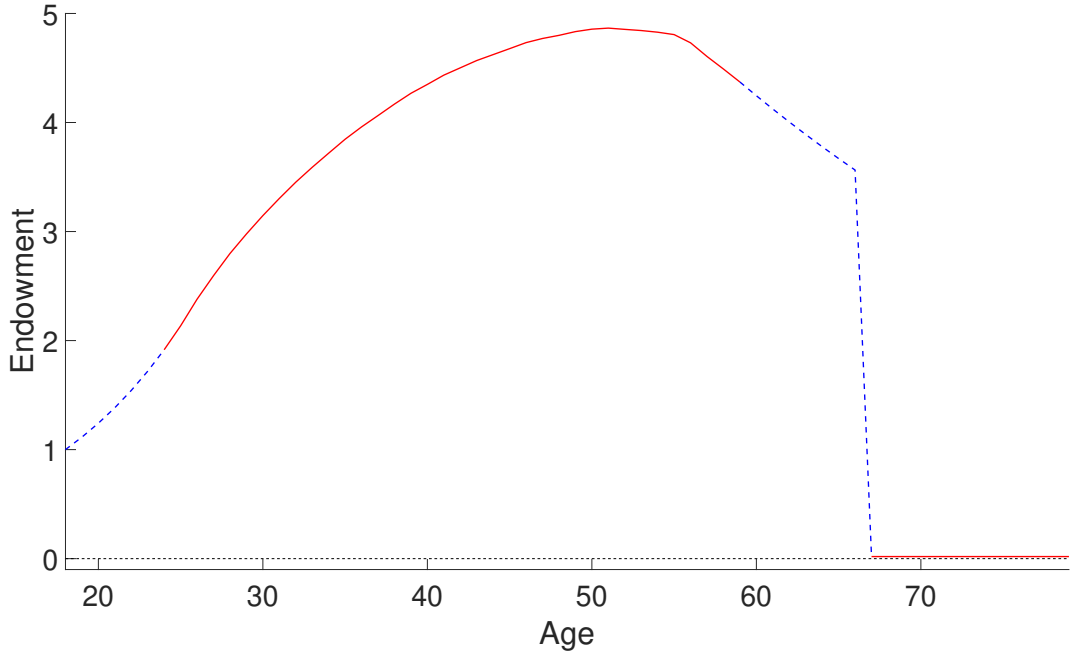
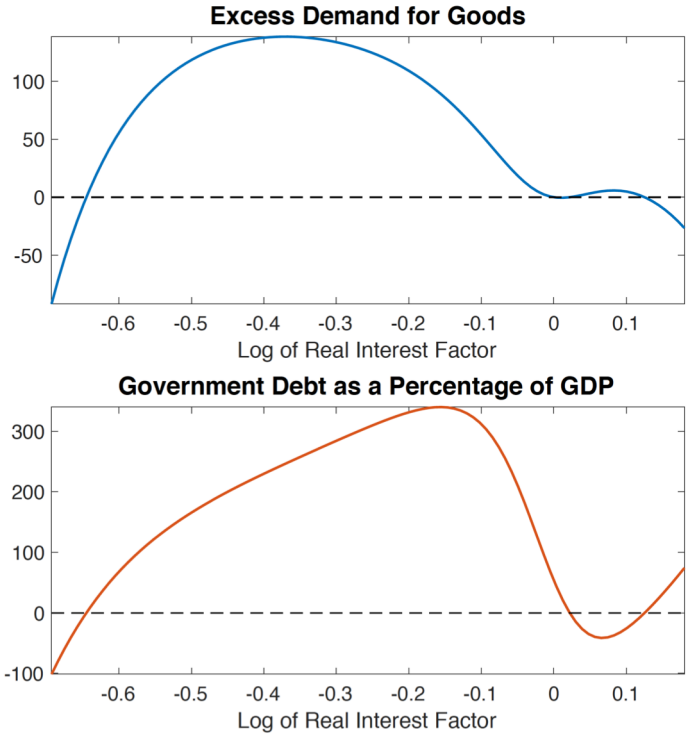


Figure 4: The endowment profile for U.S. males

Calibrated 62-period model with Guvenen-et-al endowment profile

Steady States of the 62-Period Model



This calibrated example has four steady states

Three of them are generationally autarkic and money has no value

One of them is the golden-rule. At the golden-rule money has positive value

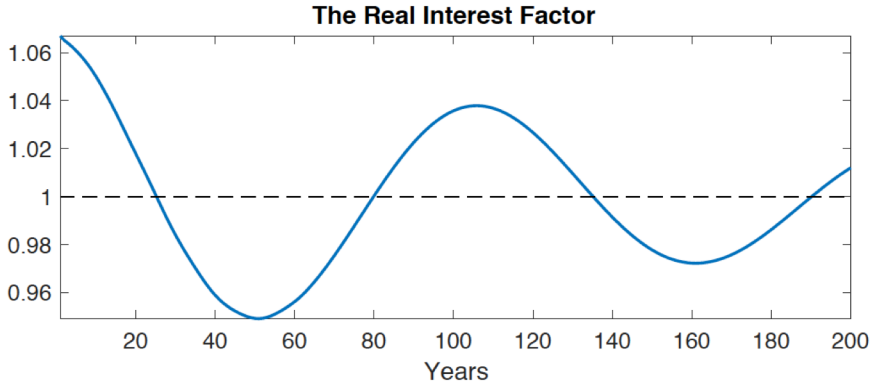
Determinacy Properties of the Steady State

Equilibrium Discount Factors					
Type	Value of Real Rate	Value of b	# Unstable Roots	# Free Initial Conditions	Degree of Indeterminacy
Steady-State A	-52.5%	0	60	61	1
Steady-State B	0%	53.7% of GDP	59	61	2
Steady-State C	2.2%	0	60	61	1
Steady-State D	13.3%	0	61	61	0

TABLE 2. Steady States of the 62-generation Model

What we Show in the Paper

- In our 62-period example there is a unique equilibrium where money has value
- At that equilibrium there are 2 degrees of indeterminacy when fiscal policy is active and monetary policy is passive
- There is one degree of indeterminacy when monetary and fiscal policy are both active



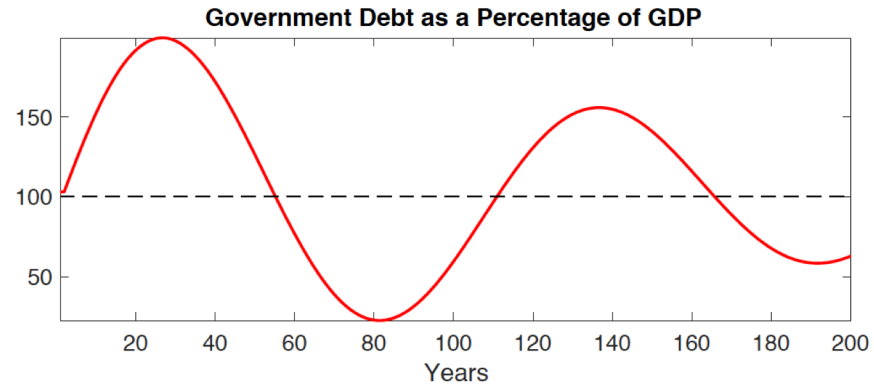


FIGURE 6. The impact of changes in the initial price level and the real interest rate: p_1 exceeds its steady state values by 3%

Equilibrium dynamics are highly persistent

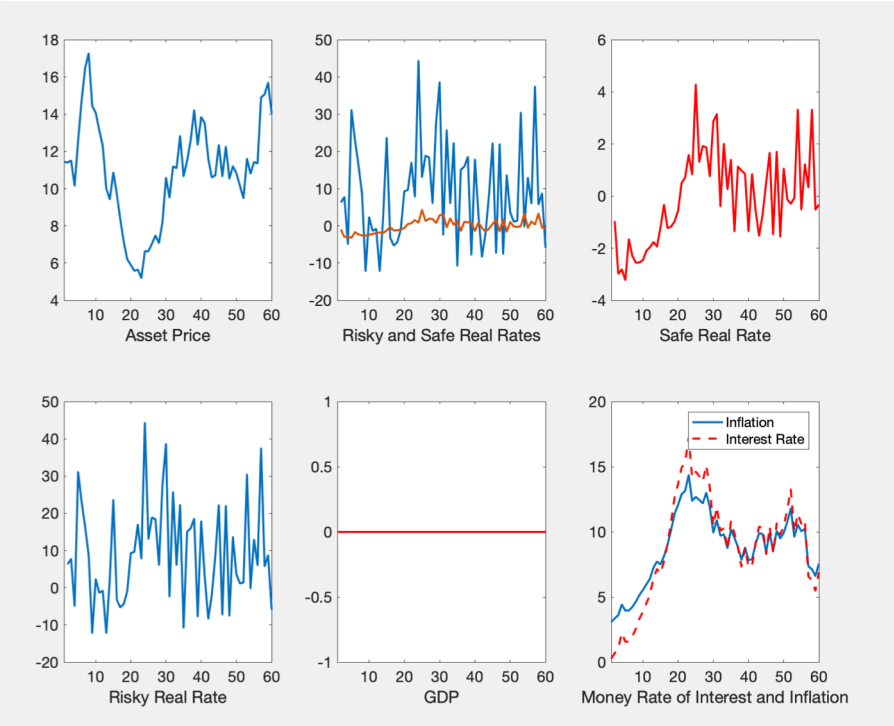
The monetary steady state displays two-degrees of indeterminacy when monetary policy is passive and fiscal policy is active

The FTPL Fails to uniquely determine the initial price level

A Stochastic Extension

- Active fiscal policy
- Deficit of 2% of GDP
- Active Taylor Rule (1.5 coefficient)
- Shocks to beliefs about asset prices

A Stochastic 62-Period Model

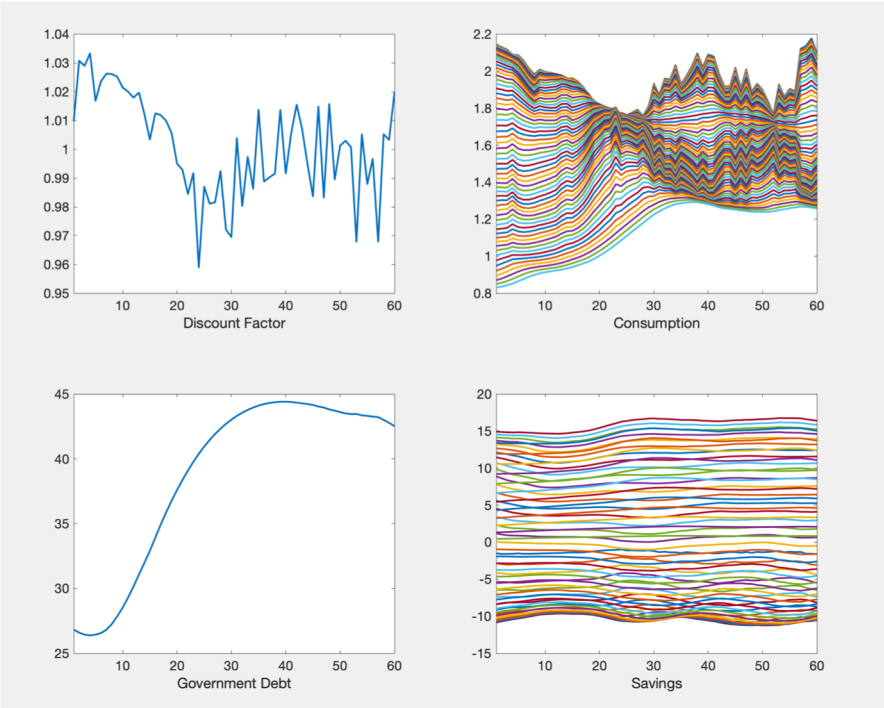


This simulation adds a shock to asset prices of 0.125 in every period

The endowment is constant

The model generates a substantial risk premium

A Stochastic 62-Period Model

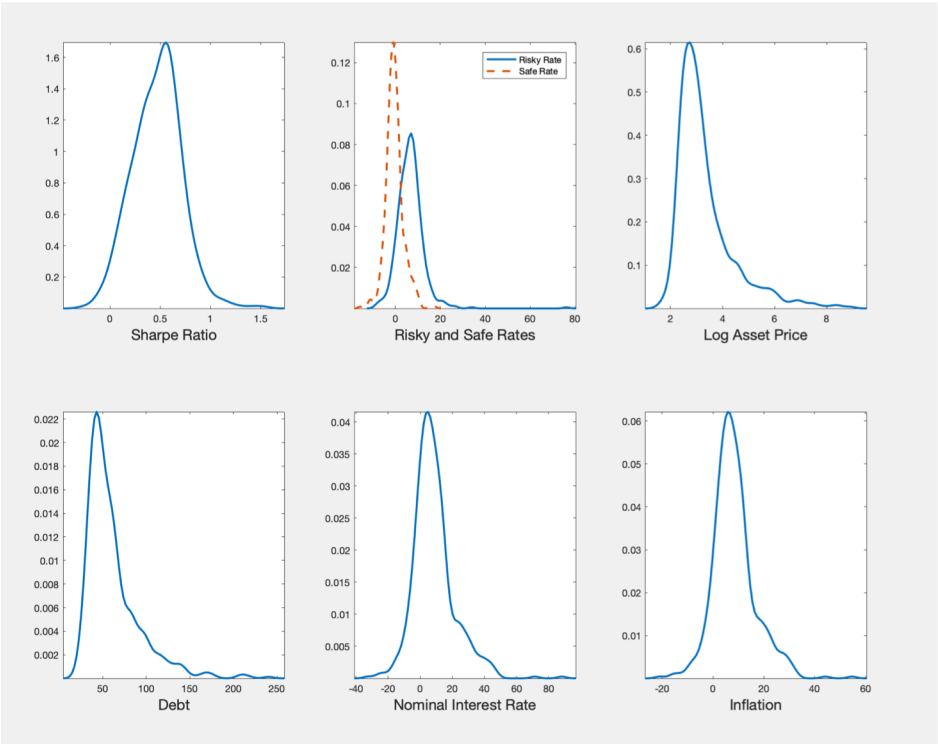


This panel shows consumption and savings by generation

It also shows government debt as a percentage of GDP

The top left panel shows realizations of the real stochastic discount factor

A Stochastic 62-Period Model



This panel shows the distributions of risk and safe rates, the Debt to GDP ratio, the asset price, inflation and the interest rate in 500 simulations

```
n = 500
Mean of Risky Rate  3.541
Mean of Risky Rate in 500 draws 6.5638

Mean of Safe Rate  0.15741
Mean of safe rate in 500 draws -0.43241

Sharpe Ratio       0.2698
Mean of Sharpe Ratio in 500 draws 0.46813
```

Conclusion

- Beliefs independently influence inflation and asset prices
- Central banks should actively target the inflation rate
- IN ADDITION
- Central banks/ Treasuries should target the stock market