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The Good and the Bad Fiscal Theory of the Price Level

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The Good and the Bad FTPL

Is a lecture on the Fiscal Theory of the Price Level "Art for Art's Sake"?

- Yes and No

- Yes: I love economic theory and take it very seriously:
  - Propositions and theories that are internally inconsistent must be exposed and relegated to the dustbin of intellectual history.

- No: It has direct practical policy design significance for the real world.
  - The FTPL is false theory
  - It asserts that there is no intertemporal budget constraint for the government, the central bank and the consolidated State
  - The State can pursue essentially arbitrary programs/rules/policies for public spending, taxes, monetary issuance and policy rates (non-Ricardian programs).
  - Insolvency of and default by the sovereign are never a problem: the price level will assume whatever value is required to make the value of the outstanding stock of nominal government bonds – priced at their contractual values – equal to the PDV of whatever resources the State has available for debt service.
  - This is a dangerous message to convey to any government: spend more, tax less, the price level will take care of it.
    - Japan – FTPL said to have reached PM Abe, through Prof. Koichi Hamada.
    - Brazil – FTPL influenced monetary policy debate: Lara Resende: high real interest rates caused by high nominal policy rates.

The Good and the Bad FTPL

- What the FTPL is not:
  1. Unanticipated inflation or financial repression can reduce the real value of nominal public debt.
  2. The Good Fiscal Theory of the Price level – The Fiscal Theory of Seigniorage (FRS).
     - Inflation is always and everywhere a monetary phenomenon.
     - In modern economies with central banks issuing fiat monetary liabilities, money is ultimately a fiscal phenomenon.

- One obvious objection to the FTPL:
  - I'm a Keynesian – in my view of the world money wages and the nominal prices of processed goods and services are sticky/rigid/predetermined: the general price level cannot make the required FTPL jumps.
  - Sims (2011, 2016a): sticky price level is no problem. Real private consumption (and – WHB – real private investment?) can jump if the price level cannot!
  - Bingo, the Fiscal Theory of the Level of Economic Activity (FTLEA)
  - Unfortunately, the FTLEA suffers the same fate as the FTPL.

The Good and the Bad FTPL

- Two necessary conditions for valid dynamic general equilibrium analysis
  1. Count!
     a. Make sure the number of equations equals the number of unknowns
     b. Make sure the number of state variables equals the number of boundary conditions
  2. Think!
     a. If condition (1) is satisfied, make sure the equations can be solved
     b. If they can be solved, make sure that the resulting solution(s) make economic sense.

- The FTPL and the FTLEA fail on both counts.

The Good and the Bad FTPL

- History
  - Birth: Leeper (1991), Sims (1994), Woodford (1994, 1995, 2001), Cochrane (1998, 2001, 2005).
  - Death: Buiter (1998, 2001, 2002, 2005), Niepelt (2004).
  - Resurrection: Sims (2011, 2013, 2016a, b, c), Leeper (2015), Jacobson, Leeper and Preston (2016), Cochrane (2016a,b,c).

    Conference: "Next Steps for the Fiscal Theory of the Price Level" at the Becker Friedman Institute for Research on Economics at the University of Chicago, 1 April, 2016.
  - Second death: Buiter (2017a,b,c).
  - Not an empirical issue: logically inconsistent theories have no empirical implications.
  - Not a disagreement about the realism of certain assumptions: if a theory is logically inconsistent, the realism or lack of it of its assumptions is irrelevant.

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- Fundamental fallacy:
  - The State does not have an IBC that has be satisfied always/identically; it only is required to be satisfied in equilibrium
  - What looks like the IBC of the State – holding with equality and with sovereign bonds valued at their contractual (free of default risk) values – is either a reflection, in equilibrium, of the IBC of the private sector (households) and/or a government (nominal) bond pricing equilibrium equation.
  - Somehow, the general price level (FTPL) or the level or real economic activity (FTLEA) sets the real value of nominal government bonds outstanding, priced at their contractual values, equal to the PDV of future State primary surpluses plus seigniorage.

- Unpleasant reality:

  Either the State ensures its IBC is satisfied identically, that is, for all possible values of prices, quantities and other variables that enter into the IBC – not just in equilibrium or one of three outcomes results from the pursuit of arbitrary, non-Ricardian fiscal-financial-monetary programs (FFMPs):

  1. You satisfy the IBC of the State exactly (with equality) in equilibrium; congratulations, you have been lucky.
  2. You waste fiscal space in equilibrium. You satisfy the IBC of the State, but you have taxed too much or spent too little.
  3. You violate the IBC of the State in equilibrium. The ‘equilibrium’ isn’t an equilibrium.

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M: nominal stock of central bank money
B: number of short nominal government bonds held outside the central bank
B: number of short index-linked government bonds held outside the central bank
P : general price level,
$\pi = \dot{P} / P$: rate of inflation

i^M: Nominal interest rate on money
i: short nominal interest rate on government bonds
r: short real interest rate on government bonds
s: real value of primary surplus of State
σ: real value of seigniorage

$$\dot{M} + \dot{B} + P\dot{b} \equiv iB + Prb + i^M M - Ps \qquad (1)$$

$$\sigma \equiv \frac{\dot{M} - i^M M}{P} \qquad (2)$$

The Good and the Bad FTPL

The intertemporal budget identity of the State:

$$\frac{B(t)}{P(t)} + b(t) \equiv \int_t^{\infty} e^{-\int_t^v r(u)du} \left(s(v) + \sigma(v)\right) dv + \lim_{v \to \infty} e^{-\int_t^v r(u)du} \left(\frac{B(v)}{P(v)} + b(v)\right) \qquad (3)$$

The solvency constraint of the State: no open-ended Ponzi finance

$$\lim_{v \to \infty} e^{-\int_t^v r(u)du} \left(\frac{B(v)}{P(v)} + b(v)\right) = \frac{1}{P(t)} \lim_{v \to \infty} e^{-\int_t^v i(u)du} \left(B(v) + P(v)b(v)\right) \leq 0 \qquad (4)$$

Note: solvency constraint of State is not:

$$\lim_{v \to \infty} e^{-\int_t^v r(u)du} \left(\frac{M(v) + B(v)}{P(v)} + b(v)\right) = \frac{1}{P(t)} \lim_{v \to \infty} e^{-\int_t^v i(u)du} \left(\frac{M(v) + B(v)}{P(v)} + b(v)\right) \leq 0$$

Reason: irredeemability of monetary base; Matters for FTS, not for FTPL/FTLEA

Equations (3) and (4) imply the intertemporal budget constraint of the State:

$$\frac{B(t)}{P(t)} + b(t) \leq \int_t^{\infty} e^{-\int_t^v r(u)du} \left(s(v) + \sigma(v)\right) dv \qquad (5)$$

FFMPs that always satisfy (5) are called Ricardian FFMPs

The Good and the Bad FTPL

- What happens if the State does not always pursue Ricardian FFMPs? Bond revaluation factor/contractual price discount factor makes an appearance:

$$D(t)\left(\frac{B(t)}{P(t)}+b(t)\right)=\int_t^{\infty} e^{-\int_t^v r(u)du}\left(\bar{s}(v)+\bar{\sigma}(v)\right)dv \qquad \textbf{(6)}$$

$$0 \le D \le 1$$

Ricardian FFMPs: $D(t) \equiv 1$

- Why does the FTPL/FTLEA not require (5) to hold identically – the way it is assumed to be for households?
  - State has unique revenue sources (taxes and seigniorage)? Irrelevant.
  - State isn't optimizing? Irrelevant
  - State is myopic/not forward-looking? Irrelevant. Even if this is true, markets and/or (foreign) courts will enforce IBC of State by doing counterfactual: does (6) hold with $D(t) = 1$, with discount rates free of default risk, for all values of P?

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- FTPL imposes (6), but leaves out *D(t)*, despite arbitrary, non-Ricardian FFMPs:

$$\frac{B(t)}{P(t)} + b(t) = \int_t^{\infty} e^{-\int_t^v r(u)du} \left(\overline{s}(v) + \overline{\sigma}(v)\right) dv \qquad \textbf{(7)}$$

FTPL hopes *P* can do the job of *D*

Unfortunately it cannot: 2 inconsistencies and 5 unacceptable anomalies

The Good and the Bad FTPL

- **Inconsistency 1:**
  - The FTPL implies an overdetermined system if there is an exogenous rule for the nominal money stock.

- **Inconsistency 2**
  - If the price level is not freely flexible but predetermined, the FTPL implies either an overdetermined system or a system that is inconsistent in another way. Below we discuss Sims's attempt to make the real and/or nominal discount factors $e^{-\int_t^v r(u)du}$ and $e^{-\int_t^v i(u)du}$, $v \geq t$ do the job in the FTLEA that the price level is meant to do in the FTPL.

Is there an escape route from overdeterminacy for the FTPL? Consider: (1) a flexible price level; (2) an exogenous nominal policy rate rule and an endogenous nominal money stock and (3) a positive stock of nominal bonds.

- **Anomaly 1.** The FTPL can generate a negative price level.

- **Anomaly 2.** There is no FTPL if all public debt is index-linked (or denominated in foreign currency).

- **Anomaly 3.** The FTPL can determine the price of phlogiston – it can determine an equilibrium price without an associated quantity.

- **Anomaly 4.** The FTPL makes as much sense as the HTPL or the 'Mr Jones Theory of the Price Level'.

- **Anomaly 5.** When the equilibrium bond pricing equation is specified correctly – with the government bond revaluation factor - there is no FTPL.

The Good and the Bad FTPL

Sims's FTLEA:

$$\frac{B(t)}{P(t)} + b(t) = \int_t^{\infty} e^{-\int_t^v r(u)du} \left(\overline{s}(v) + \overline{\sigma}(v)\right) dv \qquad (7)$$

The price level is predetermined. Can the real discount factor for the augmented primary surplus ensure that (7) holds always?

Consider the following two non-Ricardian FFMPs:

$$\overline{s} = s(t) + \sigma(t)$$

$$i(t) = \delta + \pi(t)$$

$$\delta > 0$$

$$\text{or}$$

$$B(t), b(t) \geq 0$$

$$\overline{s} = s(t) + \sigma(t) < 0$$

$$i(t) = \text{ anything at all}$$

With the first of these FFMPs we have:

$$\frac{B(t)}{P(t)} + b(t) = \frac{\overline{s}}{\delta} \qquad (8)$$

Equation (8) can only be satisfied by happenstance

The Good and the Bad FTPL

- Sims's adds nominal long-maturity bonds (a consol/perpetuity paying on unit of money forever):

$$P^{\ell}(t) = \int_t^{\infty} e^{-\int_t^v i(u)du} dv$$

The IBC of the State is now:

$$\frac{B(t)}{P(t)} + b(t) + \frac{B^{\ell}(t)}{P(t)} \int_t^{\infty} e^{-\int_t^v i(u)du} dv = \int_t^{\infty} e^{-\int_t^v r(u)du} \left(\bar{s}(v) + \bar{\sigma}(v)\right) dv$$

Consider the following two non-Ricardian FFMPs:

$$\bar{s} + e^{-\int_t^v \pi(u)du} \frac{B^{\ell}(t)}{P(t)} = s(v) + \sigma(v), \quad v \geq t$$

$$i(t) = \text{anything at all}$$

or

$$B(t), b(t), B^{\ell}(t) \geq 0$$

$$\bar{s} = s(t) + \sigma(t) < 0$$

$$i(t) = \text{anything at all}$$

With the first of the non-Ricardian FFMPs we return to equation (8). The second is always inconsistent.

The Good and the Bad FTPL

- The Fiscal Theory of Seigniorage (Buiter (2007, 2014))
  - Central banking is (most of the time) profitable
  - The central government Treasury/MoF is the beneficial owner of the central bank
  - Why is central banking profitable?
    - $i > i^M$ except at ELB
    - Irredeemability of central bank money.
- Equivalent representation of IBC of State (only short nominal government bonds for simplicity):

$$\frac{M(t)+B(t)}{P(t)} \equiv \int_t^\infty e^{-\int_t^v r(u)du}\left(s(v)+\frac{\left(i(v)-i^M(v)\right)M(v)}{P(v)}\right)dv + \lim_{v\to\infty} e^{-\int_t^v r(u)du}\left(\frac{M(v)+B(v)}{P(v)}\right)$$

With the solvency constraint in equation (4), this becomes:

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$$\frac{M(t)+B(t)}{P(t)} \leq \int_t^\infty e^{-\int_t^v r(u)du}\left(s(v)+\frac{\left(i(v)-i^M(v)\right)M(v)}{P(v)}\right)dv+\lim_{v\to\infty} e^{-\int_t^v r(u)du}\frac{M(v)}{P(v)}$$

$$=\int_t^\infty e^{-\int_t^v r(u)du}\left(s(v)+\frac{\left(i(v)-i^M(v)\right)M(v)}{P(v)}\right)dv+\frac{1}{P(t)}\lim_{v\to\infty} e^{-\int_t^v i(u)du}M(v)$$

- So at the ELB this becomes:

$$\frac{M(t)+B(t)}{P(t)} \leq \int_t^\infty e^{-\int_t^v r(u)du}s(v)dv+\frac{1}{P(t)}\lim_{v\to\infty} e^{-\int_t^v i^M(u)du}M(v)$$

So helicopter money drops work (boost nominal demand) even if the economy is in a permanent liquidity trap) if you boost the money supply at time *t* and subsequently grow it at a proportional rate i^M

The Good and the Bad FTPL

- **Conclusion**
  - The FTPL and FTLEA are false theories. It is time to re-bury them.
  - The Fiscal Theory of Seigniorage asserts that balance sheet expansion/contraction by the central bank always has a fiscal dimension. In 2015 the Fed paid about $97.7bn in regular profits to the US Treasury. In addition, the US Congress raided the reserves of the Regional Reserve Banks to the tune of $19.3bn – to help fund the Fixing America's Surface Transportation Act (FAST Act!).
  - The FRS is very much alive.

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Appendix A-1

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