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The Fiscal Theory of the Price Level

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The Fiscal Theory of the Price Level (FTPL) has led to lively academic discussion over the last few years. Supporters claim that the theory challenges the conventional view that inflation is always and everywhere a monetary phenomenon, and the corresponding policy view that an independent central bank powerful to impose the seigniorage[1] time path is sufficient to guarantee price stability. The theory has also been presented as providing a potential rational for the imposition of fiscal restrictions in monetary unions, where incentives for fiscal free-riding are higher than in a single-country setting. Critics, on the other hand, claim that the theory lacks empirical relevance or, in the extreme view, that it is simply a fallacy.

This review briefly discusses the main implications and controversial aspects of the FTPL, taking as a benchmark the classical unpleasant arithmetic framework of Sargent and Wallace (1981).

[1] Seigniorage refers to the evolution of the monetary base, which only the central bank can create and destroy.

Government solvency as a starting point[2]

The central element in the FTPL is the explicit consideration of the intertemporal condition reflecting government solvency along with the discussion as to whether it should be treated as a constraint or just as an equilibrium condition. We start by stating this solvency condition. For that purpose, let us first write the flow budget constraint that the (consolidated) government faces every period:

(1a)

$$\frac{\Delta B_t}{P_t} = R_{t-1}\frac{B_{t-1}}{P_t} + (g_t - \tau_t - \frac{\Delta M_t}{P_t})$$

or

(1b)

$$\frac{B_{t-1}}{P_t}(1+R_{t-1}) = \frac{B_t}{P_t} + (\tau_t + \frac{\Delta M_t}{P_t} - g_t)$$

where B is nominal outstanding public debt, M is base money, R is the nominal interest rate, P is the price level, g is real government spending, and τ is real tax revenue net of transfers. Expression (1) just says that, each period, the change in outstanding public debt must be equal to the government deficit of the period, which includes interest payments plus the primary deficit inclusive of seigniorage revenues.

Rearranging terms, expression (1) can be seen to imply that debt dynamics is described by the following first order difference equation:

$$\frac{B_t}{P_t} = \left[\frac{B_{t+1}}{P_{t+1}} + (\tau_{t+1} + \frac{\Delta M_{t+1}}{P_{t+1}} - g_{t+1})\right]\left(\frac{1}{1+r_t}\right)$$

where r is the real interest rate. Thus, the discounted value of outstanding debt plus the primary surplus of a given period equals the value of outstanding debt in the previous period.

This difference equation can be used to iterate forward in the right hand side of (1b) in order to eliminate future debt terms. After T iterations, the expression becomes:

(2)

$$\frac{B_{t-1}}{P_t} = \sum_{i=0}^{T}\delta_i(\tau_{t+i} + \frac{\Delta M_{t+i}}{P_{t+i}} - g_{t+i}) + \delta_T\frac{B_{t+T}}{P_{t+T}}$$

where δ is the discount factor appropriately defined as a function of future real interest rates. The second term in the right hand side of (2) is the present value of future outstanding debt, which will converge to zero under the assumption that future debt issue remains at levels dominated by the discount factor[3]. Thus, continuing with the sequential elimination of debt terms in (2), the resulting limiting expression is the following:

[2] The message of this section is that, in order to be solvent, the government must generate a discounted future stream of surpluses equal to the value of its outstanding debt. This is formally stated in expression (3), which is derived from the familiar flow constraint (1). Readers not interested in the algebraic details leading from (1) to (3) may just keep in mind both expressions and skip this section without loss of continuity.

[3] Note that this assumption will be satisfied whenever government debt follows a stable non-explosive time path. However, ever increasing debt levels are not excluded as log as they are offset by the discount factor.

(3)

$$\frac{B_{t-1}}{P_t} = \sum_{i=0}^{\infty} \delta_i (\tau_{t+i} + \frac{\Delta M_{t+i}}{P_{t+i}} - g_{t+i})$$

Expression (3) is the consolidated government solvency condition. It states that, for any period *t,* the real value of outstanding debt must be equal to the real discounted value of future government surpluses.

Unpleasant arithmetic

If seen as a resource constraint that must be satisfied for any price and debt levels, condition (3) implies that, at least implicitly, a coordination scheme between monetary and fiscal policies is always in place. The reason is that seigniorage is a source of government revenue, and so its evolution must be compatible with the evolution of the primary fiscal surplus in order to guarantee that (3) holds. Therefore, monetary and fiscal policy should not be analyzed in isolation from each other. This insight underlies the unpleasant arithmetic argument of Sargent and Wallace (1981), the classical reference of a holistic approach to macroeconomic policy analysis.

According to this argument, if default is ruled out, (3) implies that one policy authority must necessarily "blink" in order to guarantee government solvency. Their analysis focus on the case in which the monetary authority blinks. That is, they proceed under the assumption that the policy coordination scheme in place is one in which fiscal policy moves first, setting an exogenous path for real spending and taxes. Monetary policy is then forced to just manage the debt path implied by the fiscal authority choice, adjusting the path of seigniorage so as to satisfy (3).

This policy setting combined with a quantitative theory demand for money implies that tight monetary policy today directed at fighting current inflation will eventually lead to higher *future* inflation, since the monetary authority will be forced by condition (3) to offset the current decrease in seigniorage with an increase at some point in the future. Besides, if demand for money depends on expected inflation, tight money today that signals loose money in the future will in fact reduce current money demand and lead to higher *current* inflation as well.

This unpleasant arithmetic will strongly constraint the ability of monetary policy to control inflation unless the monetary authority is able to impose a seigniorage path that forces the fiscal authority to blink.

Autonomous policy behaviour in the FTPL

A critical distinguishing feature of the FTPL is the assumption that fiscal and monetary policies are autonomous. That is, each policy authority sets its instruments according to its own targets and independently from each other. In terms of simple rules, the assumption may be formally expressed as follows:

(4)

$$R_t = F(\pi_t, y_t) + \varepsilon_t$$

with

$$F_1 \geq 0, F_2 \geq 0$$

(5)

$$\tau_t - g_t = G(\frac{B_{t-1}}{P_{t-1}}, y_t) + \nu_t$$

with

$$G_1 \geq 0, G_2 \geq 0$$

where π is the inflation rate, y is the output gap, and ε and ν are policy shocks. Expression (4) represents monetary policy behaviour as adjusting interest rate in response to inflation and output evolution. Expression (5) models fiscal policy as adjusting the primary surplus (exclusive of seigniorage) in response to debt accumulation and output evolution. The exogenous non-systematic component of each policy is represented by the processes ε and ν, respectively, which are stochastically independent.

Therefore, according to the policy setting defined by (4) and (5), monetary policy is conducted independently of the evolution of fiscal variables, involving no direct feedback from the government budget that could force it to provide seigniorage in response to an eventual lack of fiscal discipline. Similarly, fiscal policy is conducted without any direct influence from monetary policy actions. Indeed, the only possible interactions between monetary and fiscal policies embedded in this setting are those coming through general equilibrium channels[4].

[4] For instance, a monetary authority increase in rates in response to inflationary pressures may affect output and trigger a fiscal reaction.

Solvency as an equilibrium condition rather than as a constraint

One important implication of autonomous policy behaviour is that condition (3) need not be satisfied for any value of the endogenous variables *B* and *P*. Thus, assume for simplicity that there is no stabilization policy ($F_2 = G_2 = 0$), and suppose that (4) is characterized by a positive ($F_1 > 0$) and strong response to inflation and (5) by a nil reaction to debt accumulation ($G_1 = 0$). With such a specification the primary surplus exclusive of seigniorage is exogenous and the monetary authority imposes a strict path for seigniorage. Therefore, unless *B* and/or *P* adjust, there is no guarantee that the resulting discounted value of future primary surpluses inclusive of seigniorage in the right hand side of (3) will be equal to the outstanding level of real government debt in any given period. With *B* predetermined by past decisions, the adjustment falls[5] in *P*.

If condition (3) is only satisfied by certain price level paths, it becomes a *condition for equilibrium* and makes fiscal expectations directly relevant for price level determination. As we argue below, in such a framework, fiscal behaviour may affect the price level even with a strict path for seigniorage. Conceptually, this is in sharp contrast with Sargent and Wallace unpleasant arithmetic framework, where (3) is seen as a true *resource constraint* that must be satisfied for *all* admissible paths of the endogenous variables, so a strict path

[5] For exposition simplicity, we are implicitly assuming that the real interest rate is exogenous. More realistically, if *r* is endogenous, the adjustment could also come through the discount factor δ in the right hand side of (3).

for seigniorage necessarily forces fiscal discipline.

The fact is that the FTPL has put forward the interpretation of expression (3) not as a constrain but as a stock valuation equation that determines the value of outstanding government debt as a function of future discounted surpluses, in the same way as the future discounted value of a company dividends determines the value of its outstanding stock shares. In this interpretation, the government does not need to calibrate the path of primary surpluses to ensure that its present value budget equation (3) holds for all admissible price paths, in exactly the same way as a company does not calibrate its dividend stream to guarantee that the present value formula of its stock value holds for all possible values of its stock price. In fact, in line with this interpretation, the government may issue debt at the levels it likes, as a company can issue equity with no budget constraint limiting the issue operation. In both cases, the issuing policy will interact with private sector demand to clear the market, providing an equilibrium condition.

Policy regimes

When equations (3), (4), and (5) are inserted in a general equilibrium model of the economy several policy regimes can be supported as equilibrium outcomes. In the FTPL literature a distinction has been made between stable and non-stable equilibrium, and the analysis has to a large extend been developed in a closed economy framework.

Regarding stable equilibria, the discussion has focused on two particular cases of the policy setting represented by (4) and (5). One case is characterized by a vigorous anti-inflationary monetary policy and a disciplined fiscal behaviour. In terms of expression (4) and (5), we would have that $F_1 > 0$ and large enough so as to induce an increase in the real interest rate in response to inflationary pressures, and $G_1 > 0$ and large enough so as to generate a stable path for debt that guarantees government solvency. This case defines a stable *monetary dominance* policy regime, where the monetary authority sets its seigniorage path and then the fiscal authority reaction to debt accumulation generates the fiscal primary surplus path needed to satisfy solvency condition (3) for any given real value of outstanding government debt. Under this regime, inflation is determined by monetary policy actions according to conventional money demand and supply mechanisms.

The second particular stable case is characterized by a weak anti-inflationary monetary policy and lack of fiscal discipline. More precisely, we would have $F_1 \geq 0$, and if positive too small so as to induce increases in the real interest rate in response to inflationary pressures. In the fiscal side $G_1 \geq 0$, and if positive too small so as to generate a stable debt path that guarantees government solvency. This case defines a stable *fiscal dominance* policy regime. Under this regime, none of the policy authorities guarantee a stable path for government debt implying that solvency condition (3) will hold for any given real level of outstanding public debt. As a consequence, only those paths of B and P that adjust to guarantee that (3) holds will be compatible with this regime. This, as we have discussed, requires that (3) be interpreted as an equilibrium condition.

This is the sort of fiscal regime that has been emphasized by the FTPL to put forward the argument that fiscal factors may have effects on the evolution of inflation that are *independent* of the

evolution of seigniorage. In particular, under the fiscal dominance regime just described, fiscal changes (current or expected) will affect the discounted value of future surpluses in the right hand side of (3), since neither the monetary nor the fiscal policy programs are expected to offset them. Given inherited nominal debt, this implies that fiscal shocks (or future expected fiscal actions) will force price adjustments in order to meet condition (3), thus affecting the evolution of inflation. The economic mechanisms that according to the FTPL underlies these price adjustments is the wealth effect of fiscal disturbances on private expenditure: A tax cut, for instance, will reduce the discounted stream of government surpluses, implying a higher expected after-tax income. As a consequence, the private sector will feel wealthier, which will lead to an increase in the demand for goods and services. This increase in demand will push prices up[6].

Another interesting dimension of the FTPL is its potential to generate inflation or deflation spirals as non-stable (explosive) equilibrium outcomes. This turns out to be the case if the monetary authority insists in implementing a vigorous anti-inflationary policy when the fiscal authority lacks discipline. More precisely, suppose that $F_1 > 0$ and large so as to imply real interest rate increases in response to inflationary pressures, and $G_1 \geq 0$ and if positive too small so as to guarantee a stable debt path compatible with government solvency. According to Sargent and Wallace unpleasant arithmetic framework, this policy regime is not feasible because none of the policy authorities "blink": although the monetary authority sets a strict path for seigniorage, the fiscal authority is not forced to set a primary surplus path that guarantees condition (3). Therefore, the policies are seen as inconsistent with each other. Under the FTPL framework, however, this policy combination can be supported as an equilibrium, and so the underlying fiscal and monetary policies are potentially consistent. The resulting equilibrium does not have desirable properties, however. Specifically, this equilibrium is characterized by a dynamic behaviour in which when discounted future primary surpluses are too small (too large) the price level have to adjust upward (downward) in order to satisfy condition (3), leading to a higher (lower) interest rates as the monetary authority vigorously responds to inflation (deflation) developments. Higher (lower) interest rates then lead to higher (lower) level of government nominal liabilities, which in turn lead to higher (lower) inflation through the adjustment required by solvency condition (3). The result is, therefore, an inflation (deflation) spiral. Certainly, the inflation and deflation cases are not symmetric, since the zero floor value for nominal interest rates puts a halt to the process in the deflation case.

General policy implications

The policy regime taxonomy described above leads to two interesting policy conclusions. First, when fiscal policy behaviour does not guarantee government solvency the best choice for monetary policy is a weak anti-inflationary behaviour. This lack of a vigorous monetary policy will settle the economy in a fiscal dominance stable path where fiscal factors

[6] It should be emphasized that Ricardian equivalence does not hold in this framework, since it considers fiscal changes that affect the present value of primary surpluses. This is why a fiscal dominance equilibrium is sometimes referred to as a non-Ricardian equilibrium.

will affect inflation and its monetary control is given up. This is a better choice, however, than opposing an aggressive anti-inflationary monetary policy to the non-disciplined fiscal behaviour, which, as we have argued, would place the economy in an inflationary/deflationary spiral. This possibility does in fact imply that an independent central bank powerful to impose a strict seigniorage time path may not be sufficient to guarantee price stability, in contrast with Sargent and Wallace unpleasant arithmetic framework.

Second, a monetary dominance regime provides an attractive policy framework. Aside from the fact that it may be politically more realistic to have monetary policy in control and technically more feasible to fine-tune monetary policy actions, a monetary dominance regime avoids the inflationary risk associated with fiscal dominance policy settings.

Policy implications for monetary unions

An additional interesting aspect of the FTPL has been its application to rationalize the imposition of fiscal constraints to countries forming a monetary union. The argument goes as follows. Let us consider the union wide fiscal solvency condition, which states that the real value of the union wide outstanding government debt must be equal to the union wide discounted value of future primary surpluses inclusive of seigniorage. This condition is formally identical to condition (3), once the fiscal variables are defined in term of union wide aggregates, and embeds the assumption of unlimited lending/borrowing activity across union governments. In this setting, according to the FTPL, a single government lacking fiscal discipline and taking fiscal actions that reduce the value of the discounted stream of future surpluses of the union will force an upward adjustment of the union price level in order to guarantee solvency. This implies that a single government may place the union in a fiscal dominance regime, putting at risk price stability in the whole union. Therefore, fiscal constraints that impose fiscal discipline across the union are recommended, specially given the incentives for fiscal free-riding.

The need for the fiscal discipline that would allow the union to operate under a monetary dominance regime is widely recognized. In this sense, the FTPL implications in terms of fiscal constrains are not a novelty. What is a new potentially relevant element is that those constrains seem unavoidable in the FTPL framework because a strong credible monetary authority is not sufficient *per se* to guarantee price stability.

A more controversial issue is how strict those restrictions should be, as EMU and the debate around its Stability and Growth Pact (SGP) have shown. The point in this respect is that while avoiding fiscal dominance regimes requires government solvency, the latter requires just a weak reaction to debt accumulation, and it is compatible with an active stabilization policy. That is, $G_1 > 0$ is needed, but it can be low in absolute value and still be sufficient to guarantee condition (3). Besides, we can have $G_2 > 0$ without jeopardizing solvency[7]. Therefore, solvency can be obtained without necessarily keeping the fiscal deficit below 3% and pursuing a medium term close-to-balance or in surplus position. In this sense, from

[7] All the results discussed in this review apply when stabilization policy is active, as the derivatives in expressions (4) and (5) suggest.

the FTPL perspective, the SGP may be seen as too strict, tightening fiscal hands to an extreme not really required, and so unnecessarily restricting a potentially useful macroeconomic stabilization tool.

Criticisms

The FTPL has been criticized in two main dimensions. The first relates to its treatment of solvency condition (3) as an equilibrium condition. The second concerns its apparent lack of empirical relevance.

Regarding the treatment of condition (3), the criticism originates in the FTPL assumption that fiscal and monetary policy are autonomous. As it has already been discussed, this opens the way to interpret the government solvency condition as an equilibrium condition, and not as a constraint. The assumption is central to the FTPL and controversial. It requires that default for the fiscal branch of the government (i.e. seigniorage revenues aside) be rule out so consumers really see the fluctuations in the present value of government primary surplus as fluctuations in their wealth and make corresponding adjustments in consumption, thus activating the wealth mechanism that underlies the FTPL arguments. This may be reasonable up to a certain point of fiscal profligacy. But, beyond that point, when fiscal stress creates the perception of government insolvency, a debt selling mood may dominate, and the assumption that monetary and fiscal policy are autonomous may be seen as untenable. Under pressure, the central bank may be expected to jump in and provide seigniorage financing support. When this happens we are back in the world of the unpleasant monetarist arithmetic, where one of the policy authorities is expected to act in order to reestablish solvency. If this is so, treating condition (3) as a true resource constraint would seem the appropriate theoretical postulate. Among other authors, Buiter (1998, 1999) has been strongly critical about this point, concluding that the theory is logically flawed.

An additional weak point connected with the interpretation of solvency condition (3) is the policy implication for monetary unions. As we have mentioned, the result depends on the restrictions imposed on the lending/borrowing activity across union governments. Under perfect risk sharing, governments could lend/borrow indefinitely to/from each other. In such a case, the only relevant intertemporal government present value condition would be the aggregate condition for all the government of the monetary union: It would not matter that a single specific government looked insolvent as long as some other government was accumulating enough lending resources to offset that behaviour, so aggregate solvency was guaranteed. Under this assumption, a single undisciplined government can create problems, and the size of the insolvent government matters, since a large government with large outstanding liabilities would generate in the fiscal dominance regime more price instability that a small government with a relatively small stock of public debt. However, the assumption of perfect risk sharing is unrealistic because no government would engage in indefinitely lending, which would mean accepting the possibility of permanent wealth transfers from one country to another. Thus, imperfect risk sharing seems the most appropriate working assumption, and in particular the assumption that each government in the union must guarantee their own solvency. But when this dose of realism is introduced, FTPL models imply that even the smallest country of the union can in fact determine the price level of the

whole union. How to solve this puzzle remains an open and important question in order to enhance the credibility of the FTPL.

With regard to the empirical relevance of the FTPL, it should be first mentioned that the empirical discrimination between fiscal and monetary dominance is not a straightforward matter because the long run solvency conditions (3) holds in both regimes. They are in this sense observationally equivalent. This does not mean, however, that the discrimination is not possible. It just means that the econometric identification problem is more difficult.

With this caveat in mind, the available evidence tends to point against the FTPL. Both in the US and in the EU country members monetary dominance seems to be the prevalent regime. In particular, the results for the EU suggest that during the period 1979-1998 governments response to debt accumulation was generally small but sufficient to guarantee solvency, and so the prevalence of a monetary dominance regime.

A stylized FTPL model

In order to illustrate in a formal context some of the basic FTPL aspects discussed in the main text, consider the following non-stochastic IS-LM model complemented with monetary and fiscal policy rules and with the government intertemporal flow budget constraint (Flow BC) below:

(IS)

$$y_t = \beta(1+r_t)^{-1} + g_t \quad , \beta > 1$$

(LM)

$$\frac{M_t}{P_t} = \frac{y_t}{1+R_t}$$

(R-Rule)

$$R_t = \theta\pi_t + \overline{R} \quad , \quad \theta \geq 0$$

(Tax Rule)

$$\tau_t = \alpha\frac{B_{t-1}}{P_{t-1}} + \overline{\tau} \quad , \quad \alpha \geq 0$$

(Flow BC)

$$\Delta B_t = R_{t-1}B_{t-1} + P_t(g_t - \tau_t) - \Delta M_t$$

The model is solved at time t and all variable names coincide with those in the main text. The first term in the right hand side of the (IS) represents private consumption, c_t. As usual, the (IS) and (LM) expressions represent the equilibrium in the goods and money markets, respectively. Policy rules (4)-(5) in the main text are specified here as linear functions, with no reaction from policy authorities to cyclical fluctuations. Finally, (Flow BC) is the government flow budget constrain, which is expression (1) in the main text written in nominal terms.

Our focal point is fiscal behaviour, as described by the last two equations of the model. As it turns out, if $\alpha > 0$, so tax policy reacts to debt accumulation, a time path for real government debt is generated via (Flow BC) that will satisfy condition (3) in the main text, so government solvency will be guaranteed for any admissible path of B and P. In this framework, fiscal discipline will prevail and fiscal policy is

said to be *Ricardian.* Consumers expect fiscal changes will leave unchanged their live-time budget constraints, so they will not affect aggregate demand. Thus, fiscal actions will not affect price evolution, which will be fully determined by the (R-Rule)-(IS)-(LM) block of the model according to the conventional money-goods market mechanism. In this case, the economy is said to operate under a *monetary dominance* policy regime.

On the other hand, if $\alpha = 0$, so taxes are not adjusted with debt accumulation, and there is no seigniorage compensation (no additional creation of base money), an explosive path for real debt will result that will not guarantee that the government solvency condition (3) is satisfied for any admissible path of *B* and *P*. Thus, *per se*, the (Tax-Rule)-(Flow BC) block of the model does not guarantee solvency, which must then be imposed as an additional equilibrium condition. This additional condition calls for endogenous price level adjustments as a way to accommodate the lack of fiscal discipline, opening the channel advocated by the FTPL for fiscal influence in price evolution. In this framework, fiscal policy is termed *non-Ricardian* and the economy is said to operate under a *fiscal dominance* policy regime.

To look in more detail at the FTPL mechanism, let us solve a particular version of the above model. Specifically, assume that $\alpha = \theta = 0$, so fiscal policy is non-Ricardian with $\tau_t = \overline{\tau}$, and the monetary authority follows an R-peg policy with $R_t = \overline{R}$. For simplicity, take output and government spending as constant, so $y_t = \overline{y}$ and $g_t = \overline{g}$, and for further algebra simplification assume also that $\overline{y} - \overline{g} = 1$. Under this setting, the model gives the solution that follows.

The (IS) determines a constant real interest rate:

(B1)

$$(1+r) = \beta$$

Given the R-peg policy, this implies that (expected) inflation is also constant, since:

$$(1+r) = \left(\frac{1+\overline{R}}{1+\pi_{t+1}} \right) = \beta$$

and therefore,

(B2)

$$(1+\pi) = \beta^{-1}(1+\overline{R})$$

The R-peg policy also implies, according to the (LM), that money growth will have to equal the inflation rate in order to accommodate the constant demand for real balances given by:

(B3)

$$m = \frac{\overline{y}}{1+\overline{R}}$$

Now, notice that (B2) determines the inflation rate but not the price level. For price level determination we turn to fiscal behaviour. Specifically, since fiscal policy is non-Ricardian, the paths for *B* and *P* need to be adjusted so as to guarantee government solvency. That is, they need to guarantee condition (3) in the main text:

$$\frac{B_{t-1}}{P_t} = \sum_{i=0}^{\infty} \delta_i (\tau_{t+i} + \frac{\Delta M_{t+i}}{P_{t+i}} - g_{t+i})$$

which, as we have mentioned, is not guaranteed by the (Tax-Rule)-(Flow BC) block under fiscal dominance. In our setting

condition (3) boils down to a simple geometric progression. Specifically, note first that seigniorage revenues (*sr*) are constant and given by:

$$sr = \frac{\Delta M_{t+i}}{P_{t+i}} = \frac{M_{t+i}}{P_{t+i}} - \frac{M_{t+i-1}}{P_{t+i-1}}\frac{P_{t+i-1}}{P_{t+i}} = \frac{\bar{y}}{1+\bar{R}}\left(1-\frac{1}{1+\pi}\right) = \frac{\bar{y}}{1+\bar{R}}\left(1-\frac{\beta}{1+\bar{R}}\right)$$

Besides, given the constant real interest rate, the discount factor is:

$$\delta_i = (1+r)^{-i} = \beta^{-i}$$

Therefore, the government solvency condition looks like this:

(B4)

$$\frac{B_{t-1}}{P_t} = \sum_{i=0}^{\infty} \beta^{-i}(\bar{\tau} + sr - \bar{g}) = (\bar{\tau} + sr - \bar{g})\frac{\beta}{\beta - 1}$$

Given the exogenous fiscal policy and with B_{t-1} predetermined by past decisions, condition (B4) determines the price level at time *t* to be:

(B5)

$$P_t = B_{t-1}\left(\frac{\beta - 1}{(\bar{\tau} + sr - \bar{g})\beta}\right)$$

Finally, given P_t, the time path for *P*, *M* and *B* is determined by (B2), the (LM) and the (Flow BC), respectively, which completes the solution of the model.

Thus, in contrast with a monetary dominance regime, the (R-Rule)-(IS)-(LM) block does not completely determine the evolution of prices. It does determine (expected) inflation, as shown in (B2), but not the price level, which is determined by fiscal factors, as shown in (B5). Therefore, fiscal factors affect *ex post* inflation. In particular, according to (B5), a tax cut that increases the primary deficit will increase the price level. And the economic mechanism behind this price increase is indeed a wealth push in consumption demand, as can be seen by substituting in (B4) the aggregate feasibility condition $\bar{g} = \bar{y} - c$, implicit in the (IS), in order to make visible the solvency condition for the private sector:

$$\left(\frac{\beta}{\beta - 1}\right)c = \left(\frac{\beta}{\beta - 1}\right)(\bar{y} - \bar{\tau} - sr) + \frac{B_{t-1}}{P_t}$$

which says that the present value of consumption equals the present value of future net income plus outstanding assets. Thus, a tax cut increases consumption demand by increasing future discounted income. Then higher consumption demand puts pressure on prices, which adjust upwards to clear the goods market.

Does the FTPL model shed light on the Japanese experience?

Japan has been suffering from the worst recession of all industrialized countries since the Great Depression in the 1930s. It also is the first industrialized country to experience a prolonged period of deflation in the post WWII era. At the same time, its recent fiscal deficits have been large, and its debt-GDP ratio has increased to a level that has even raised concern about sustainability. How does this square with the predictions of the FTPL?

Japanese monetary policy has been constrained by the zero bound of interest rates, and has not been able, or was not determined enough to expand money supply outside the banking system. During

the period 1996-2003, monetary policy in Japan can be characterized as an interest rate peg policy with $\overline{R} \approx 0$.

Fiscal policy has gone through various changes in direction (stop and go). This has led to a loss of confidence in policy makers' ability to manage the situation. It can be argued that fiscal policy was perceived Ricardian ($\alpha > 0$) before 1998, with the slight primary deficits of 1996/97 following the large primary surpluses of the early 90s, providing an overall perception of sustainable public finances. With no room for monetary policy easing, the policy combination in those years was seen as inappropriate for an economy with zero inflation and contracting output. Advocates of the FTPL argued at the time that Japan was in need of a Non-Ricardian fiscal policy in order to activate the wealth mechanism and provide a push in private demand.

In 1998, fiscal policy shifted, with a primary deficit/GDP ratio of approximately 7% in that year, and with smaller but still large primary deficits in the following years. In fact, during the period 1998-2003 fiscal policy could arguably be characterized as non-Ricardian ($\alpha = 0$), which combined with the R-peg policy places the Japanese economy in what seems a clear non-Ricardian policy regime similar to the one discussed in this box. However, private demand has not been increasing and the economy has moved to an even more delicate situation, with deflation and stagnation dominating the scene. Does the failure of an expansionary fiscal policy to deliver positive price increases prove the FTPL wrong?

A possible explanation is that other factors are offsetting the effect of non-Ricardian fiscal expansion on demand (wealth effect). Among these possible factors, higher job insecurity could be important, with its negative effect on discounted expected income. Also, the large amount of non-performing loans that discourage further lending could be putting a brake to private spending. Without controlling for these other factors, it is impossible to make a definite judgement about the impact of the Japanese fiscal expansion on prices. Deflation could be worse without it.

Selected references on the FTPL

The following list contains selected readings on the development of the Fiscal Theory of the Price Level.

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