REFLECTIONS ON THE FISCAL THEORY OF THE PRICE LEVEL

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Abstract. In a world in which consumers correctly expect that both Ricardian and non-Ricardian policy regimes are possible in the future, the fiscal theory of the price level is valid, yet the price level is indeterminate. This result does not rely on imposing that the initial stock of nominal bonds be strictly positive, and it does not require a surprise ex post revaluation of nominal assets.

The fiscal theory of the price level has been much vilified. Some, like Buiter (1999), have accused it of being logically inconsistent. More to the point others, like Niepelt (2001), are worried that it might be a "myth" since it relies on a strictly positive initial stock of nominal public debt that, presumably, Adam did not hold in the Garden of Eden.

Yet, as Cochrane (2001) and others have repeatedly demonstrated, the fiscal theory of the price level has the seductive and robust appeal of simplicity: the government can rely on the ex post revaluation of its outstanding nominal liabilities by the price level to finance its expenditure. The real value of money (the inverse of the price level) is then is pinned down, in a non-Ricardian regime, by the ratio of the expected present discounted value of surpluses to the number of outstanding nominal bonds. As a result, the fiscal theory of the price level provides a nominal anchor to the economy if the nominal interest rate is pegged.

The difficulty with this exposition of the fiscal theory is that it hinges, as correctly pointed out by Niepelt (2001), explicitly on a positive initial stock of nominal public debt, and implicity on performing a surprise policy change in a perfect foresight framework. This is dangerous as it is seems that the whole theory rests on a shaky foundation: a surprise, unexpected ex post revaluation of nominal public debt held by the public.

I show in this paper, using a simple two-period model, that the fiscal theory is alive and kicking, in the sense that it survives reformulation in a rational expectations setup. Suppose agents correctly form expectations

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about future policy regimes (Ricardian *or* non-Ricardian). Then bondholders anticipate the revaluation of nominal debt that occurs in non-Ricardian regimes. This influences their demand for nominal debt and, as a result, affects the equilibrium price level in the Ricardian regimes. Neither policy surprises, nor a positive initial stock of nominal public debt is required for the validity of fiscal theory.

However, I establish that the possibility, however minute but correctly anticipated, that policy might be Ricardian in the future is enough to prevent the fiscal theory of the price level from serving as a nominal anchor. To put it simply, the price level in a non-Ricardian regime is the ratio of outstanding nominal bonds to the the expected present discounted value of future surplus. It is true that the former is predetermined, and that the latter can be picked arbitrarily in a non-Ricardian regime. But it does not follow that the price level is determinate, as the stock of outstanding nominal bonds is itself indeterminate, as is the level of all prices in the economy.

I present in section 1 the two-period model used to make this points. In section 2, I describe perfect foresight equilibria under Ricardian and non-Ricardian regimes. I then turn, in section 3, to a world in which agents correctly perceive in the first period that fiscal policy will be either Ricardian or non-Ricardian in the second period. The conclusion summarizes, and outlines directions for further research.

1. A two-period model

1.1. **Demography and preferences.** Consider a closed Fisher economy comprised of a continuum of identical, two-period lived agents.[1] There are no generations: all agents live simultaneously. Consumers are risk-neutral,[2] with subjective rate of time preference r.

1.2. **Assets.** The only outside asset circulating in the economy is *nominal debt*, issued by the government at a nominal rate of interest which we assume, for simplicity, to be pegged at zero. Nominal bonds are thus equivalent to Samuelsonian money—i.e., they are a pure store of value. As a shorthand, I will often call these nominal bonds "money." Note that since money provides no transactions services, our monetary economy is frictionless, as in Cochrane (1998).

The price of consumption in terms of money (inverse of the real price of money) is p_1 in the first period, p_2 in the second period. Since consumers are risk neutral, it must be the case that, in equilibrium, the expected real rate of return on money (i.e., the inverse of the inflation rate) equals the

[1]The model is inspired by Bassetto (2001).

[2]The results of the paper would not be affected qualitatively by risk aversion.

required rate of return r:

$$\mathrm{E}\left\{\frac{p_1}{p_2}\right\} = 1 + r, \tag{1.1}$$

where E denotes expectation conditional on period 1 information.

1.3. **Consumers' budget constraints.** Consumers receive unproduced, and non-storable endowments (manna from heaven) y_1 in the first period, and y_2 in the second period. Goods markets are competitive, so that consumers take p_1 and p_2 as given.

Neglecting inside assets, which are not traded in equilibrium since all agents are identical, the period budget constraints facing our consumers are thus

$$p_1 c_1 + M_1 = p_1 y_1 - \tau_1 + M_0, \tag{1.2}$$

$$p_2 c_2 + M_2 = p_2 y_2 - \tau_2 + M_1, \tag{1.3}$$

where c and τ stand for consumption and lump-sum taxes (in real terms), $M_0 \geq 0$ denotes *given* initial nominal money balances, and M_1 and M_2 are the consumer's nominal money demand in periods 1 and 2.

Consumers are forbidden to die in debt, and they accordingly must ensure that $M_2 \geq 0$. This solvency condition, along with the additional assumption that consumers are never satiated, implies that consumers always choose, in an optimal program, to satisfy the solvency condition with strict equality:

$$M_2 = 0. \tag{1.4}$$

Were this transversality condition not satisfied, our consumer would either die in debt or leave some of her lifetime resources uneaten—which would be either infeasible or suboptimal.

1.4. **Government budget.** In each period, the primary deficit of the government must be financed by seignorage (i.e., issuance of non-interest bearing nominal debt). Let g_t denote real government spending per capita[3] in period t, $t \in \{1, 2\}$, and call

$$s_t = \tau_t - g_t$$

the real primary budget surplus (deficit if negative). Then it must be true that

$$M_1 - M_0 = -p_1 s_1, \tag{1.5}$$

$$M_2 - M_1 = -p_2 s_2, \tag{1.6}$$

[3]Assume that public consumption is either useless or enters the utility function separably.

Given that consumers' money holdings in the final period are zero by the transversality condition (1.4), we can rewrite (1.6) as

$$M_1 = p_2 s_2. \tag{1.7}$$

1.5. **Equilibrium.** Since the economy is closed and the good is non-storable, private consumption equals output minus public consumption. In per capita terms, we must thus have

$$c_t = y_t - g_t. \tag{1.8}$$

for $t \in \{1, 2\}$.

2. Ricardian and non-Ricardian regimes: Perfect foresight

Let us use the foregoing model to highlight, as a starting point, the now standard distinction between Ricardian and non-Ricardian policy regimes in a deterministic setting with perfect foresight. In line with usual presentations of the fiscal theory of the price level, I first consider the last period of the model (period 2), taking as given the nominal money balances M_1 carried over into period 2 by our consumer. I then step back to the first period to explore the feasibility of non-Ricardian regimes when M_1 is *chosen* by the consumer.

2.1. **Last period.** Consider first what happens in the last period, from the perspective of which money holdings carried from the first period (M_1) are *predetermined*.

2.1.1. *Ricardian regime.* In a Ricardian policy regime, the government financing equation (1.7) is a *constraint* that must hold for all possible price levels. Consequently, given M_1, the second period budget surplus is determined by the necessity to satisfy (1.7) regardless of what p_2 turns out to be. This requires that

$$s_2 = M_1/p_2. \tag{2.1}$$

In a Ricardian regime, the real primary surplus must vary negatively with the price level, to ensure that the nominal surplus be constant and equal to the predetermined M_1. Consequently, fiscal authorities must pay attention to monetary policy (as summarized by the outstanding stock of nominal assets) when setting spending and taxes.

2.1.2. *Non-Ricardian regime.* By contrast, in a non-Ricardian policy regime, the government financing condition (1.7) is an *equilibrium condition* which enables us to compute the compute the value of government liabilities given the stock of outstanding liabilities M_1 and the government real ability to repay s_2. With one less constraint on its behavior, the government can choose any positive surplus s_2 in period 2, and disregard M_1. The price level simply adjusts to determine p_2. Solving (1.7) for p_2 indeed yields

$$1/p_2 = s_2/M_1. \tag{2.2}$$

As pointed out eloquently by Cochrane (2001), the mechanism presiding to the valuation nominal bonds is no different from the one that governs the valuation of shares. Take the total stream per capita of "dividends" associated with the nominal bond (here, the surplus in period 2). Divide it by the number of outstanding bonds per head (M_1). The result is the real value $1/p_2$ of the nominal bond. Fiscal policy plays a central role, through the government "valuation equation" (2.2), in the determination of the price level. Non-Ricardian regimes are thus the foundation of the *fiscal theory of the price level.*

It is noteworthy that non-Ricardian regimes are only feasible if $M_1 > 0$. This assumption is usually imposed without any ado by the exponents of the fiscal theory of the price level,[4] but its necessity reveals, as pointed out forcefully by Niepelt (2001), the economic phenomenon that underlies non-Ricardian regimes: the surprise *revaluation of nominal assets* in a perfect foresight model. Let us retrace indeed the logic that led us to the valuation equation (2.2):

(1) The consumers' transversality condition (1.4) must be satisfied. This requires that the demand for nominal bonds be zero in the final period.
(2) By (1.6), the change in supply of nominal bonds equals the nominal primary surplus in period 2.
(3) For an arbitrary real surplus ($s_2 > 0$), these two conditions can be satisfied at the same time if only if p_2 adjusts to equate the *real* value of outstanding bonds in period 2, M_1/p_2 to the arbitrary surplus $s_2 > 0$ set by fiscal authorities.

In more graphic terms, the surprise revaluation of outstanding nominal bonds is an extra source of revenue for the government in a non-Ricardian regime. As equation (2.2) shows, a the smaller the real surplus s_2, the larger p_2 and the smaller the real value of outstanding nominal bonds.

[4]See, to name but a few, **?**, Christiano and Fitzgerald (2000), Cochrane (1998), or Kocherlakota and Phelan (1999) or Woodford (1997).

The fiscal theory of the price level is thus not mystery some feel it is. While it is correct to assert that what makes non-Ricardian regimes possible is the transformation of (1.7) from a constraint that must hold for all price levels into an equilibrium condition, this is not an exhaustive description of the fiscal theory of the price level, as it is missing the crucial condition that initial nominal government liabilities must be positive. The alternative statement by Cochrane (2001) that the fiscal theory is at its core a valuation equation for the government gets much closer to the point, but it is still too discreet about the requirement that initial nominal liabilities be positive. A less technical and more transparent exposition of the theory should simply state that the extra freedom afforded to fiscal authorities in non-Ricardian regimes comes from the ability of the government to alter the real value of outstanding nominal assets. Accordingly, it becomes immediately clear that this greater fiscal latitude vanishes, and only Ricardian regimes remain feasible, should outstanding nominal assets happen to be zero in period 2 ($M_1 = 0$).[5]

But what happens if consumers *expect* in period 1 the government to follow a non-Ricardian policy in period 2? Will they refuse to hold nominal debt?

2.2. **First period.** Up to now, we have limited ourselves to the last period, taking M_1 as given. But M_1 is not exogenous, as it is determined by the consumers' choice in the first period. Does the analysis of the previous subsection survive the endogenous determination of M_1? To answer this question, I first briefly describe, for reference, intertemporal equilibrium under a Ricardian policy regime. I then show that non-Ricardian regimes remain possible as long as fiscal authorities can revalue an outstanding stock nominal assets in the first period, i.e., if $M_0 > 0$.

2.2.1. *Ricardian regime.* Remember that the nominal interest rate is pegged to zero. I now replicate the standard result that the price level is indeterminate under a Ricardian regime.

Intertemporal optimality require that equilibrium prices satisfy the arbitrage condition (1.1). Since there is no uncertainty, it must be the case that

$$p_1/p_2 = (1 + r). \tag{2.3}$$

This is a difference equation in the price level, but there is no boundary condition to tie its solution down to a unique equilibrium. To check this is true, pick any $p_1 > 0$. Given this p_1, the arbitrage condition (2.3) determines p_2. Now, for a given first-period budget surplus s_1, the first period government

[5]This point is made more formally and more generally in proposition 3 of Niepelt (2001).

budget constraint gives us in turn M_1 as a function of p_1. Finally, once fiscal authorities have chosen s_1, they have no latitude left to pick s_2: they must satisfy (2.1).[6]

Let us summarize. First, the *price level is indeterminate*: any $p_1 > 0$ is an equilibrium. Second, combining equations (2.3), (1.5) and (1.7), fiscal policy is bound, for any p_1 and thus for any p_2, by the *intertemporal budget constraint*

$$\frac{M_0}{p_1} = s_1 + \frac{s_2}{1+r}. \tag{2.4}$$

Whatever the price level and initial nominal debt, fiscal authorities must make sure their sequence of surpluses equalizes their real ability to repay public debt (the righthand side of (2.4)) with the real value of outstanding initial debt. The real surpluses s_1 and s_2 cannot be chosen independently of each other, and of the price level.

2.2.2. *Non-Ricardian regimes.* The previous conclusions need not hold if there is some outstanding nominal debt that can be revalued in the first period.

Take any fixed s_1 and s_2.[7] Combining (1.5) with the second period valuation equation (2.2), and using the arbitrage condition (2.3), we get

$$\frac{1}{p_1} = \frac{s_1 + s_2/(1+r)}{M_0}. \tag{2.5}$$

This expression is the first-period counterpart of the second-period valuation equation (2.2): the real value of a unit of money in period 1 equals the ratio of the real present discounted value of budget surpluses (the ability to repay, or "dividends" distributed by government) to the number of outstanding nominal liabilities. The initial price level is thus determinate in a non-Ricardian regime, because it is pinned down by fiscal policy through the equilibrium valuation equation.[8] In other terms, the fiscal theory of the price level provides a nominal anchor in the presence of a nominal interest peg.

These results point out, once again, the essential role played by asset revaluation. Only if $M_0 > 0$ are non-Ricardian regimes possible; can budget surpluses be chosen arbitrarily and independently of each other;[9] and can the

[6] I could have of course reversed the course of events, and shown that, for each p_1, there is only one value of s_1 possible once s_2 is chosen.

[7] There are other types on non-Ricardian policies. I focus here on the simplest, as do, for instance, Kocherlakota and Phelan (1999).

[8] Note also that the economic interpretation of expressions (2.4) and (2.5) is quite different, although they are look mathematically identical. The former is a constraint, while the latter is an equilibrium condition.

[9] The only constraints are that p_1 and p_2 must remain positive.

price level be determinate in spite of the nominal interest rate peg. By backward recursion, the same results hold regardless of the number of periods, and in the limit when horizons are infinite.

2.3. **So what?** None of what I have done so far is novel: both proponents and opponents of the fiscal theory of the price level are aware that the initial stock of outstanding nominal liabilities held by the public must be initially be positive for non-Ricardian regimes to be possible. Where they differ is in the what they deal with this necessity of asset revaluation in the initial period.

2.3.1. *Proponents.* Proponents of the fiscal theory implicitly do not view the "initial" period as the literal beginning of time. They understand, for sure, that Adam did not find nominal government bonds lying on the ground in the Garden of Eden. Rather, they think of the initial period as "today", or some arbitrary reference date, and ask: given the predetermined stock of outstanding nominal assets held by households today, can the government freely pick its future surpluses?

The methodological difficulty with this question is that it examines what the effect of a surprise policy change is in a perfect foresight world. In a perfect foresight world, initial money balances M_0 are based on the exact knowledge by households before period 1 of what fiscal policy is in period 1 and beyond. Exploring, as we have done above, whether fiscal authorities can pick by surprise, in periods 1 and 2, arbitrary budget surpluses that differ from the consumers' previous point forecasts is a perilous exercise, as its conclusions rely, through M_0, on the very approximation we are making! We are indeed ignoring, when we study a surprise policy change is in a perfect foresight world, that consumers are not truly surprised, that they form probability distributions over future fiscal policy, and that M_0 in reality reflects these expectations of future fiscal policy. Hypotheses and approximations are acceptable as long as they are orthogonal to the issue we are studying. But in the case of the fiscal theory of the price level, this epistemological principle is violated, as the very existence non-Ricardian regimes rests on the possibility and magnitude of asset revaluation. Thus, the essential role played by the condition $M_0 > 0$ should be a warning light that something is wrong with traditional presentations of the fiscal theory of the price level. This condition should not be crucial were this theory *only* about transforming the intertemporal budget equation of the government from a constraint into a equilibrium condition, or about valuing "money as a stock," to use the title of Cochrane's (2001) superb paper.

2.3.2. *Opponents.* Opponents of the fiscal theory of the price level, most prominently Niepelt (2001), take period 0 as the literal origin of time, in

which case it must be true that $M_0 = 0$. Niepelt (2001) concludes, in line with the predictions of our simple model, that non-Ricardian policy regimes do not exist generically (proposition 4) when $M_0 = 0$, and that "Non-Ricardian policies are not feasible because households cannot be cheated or forced to hold government debt if they must expect the latter to yield returns below the market clearing level" (p. 12).

2.3.3. *Is there a middle ground?* Proponents of the fiscal theory of the price level are undeniably correct when they (implicitly) tell us not to take the first period too literally as the origin of time. For this reason, we should not use the results of this section, or of Niepelt (2001), to condemn the fiscal theory of the price level to death here and now. There is indeed a reasonable doubt: we still do not know whether the fiscal theory of the price level survives, and if it does in which form, once we abandon the convenient but perilous framework of policy surprises in a perfect foresight world, and analyze instead the feasibility of non-Ricardian regimes in a world in which consumers are not "cheated," and form expectations of future policies.

3. Ricardian and non-Ricardian regimes: Policy expectations

I now examine, in the simple two-period model of section 1, what happens when consumers understand in period 1 that fiscal authorities may follow either Ricardian or non-Ricardian policies in the second period.[10] I still take as given initial nominal bond holdings M_0, but I will show that nothing depends qualitatively in equilibrium on whether M_0 is positive or zero, in stark contrast with the perfect foresight equilibria with surprises described in the previous section.

Fix without loss of generality the first period budget surplus s_1. Assume that it is known in period 1 that fiscal authorities will follow in period 2 either a Ricardian fiscal policy with probability ϕ, or a non-Ricardian policy with probability $1 - \phi$, with $0 \leq \phi \leq 1$. To describe the resulting equilibrium (or, rather, as we will see equilibria), I proceed backwards in time, as in section 2.

3.1. **Last period.** Since the second period is the last one, there is no further uncertainty left at $t = 2$, and the results of perfect foresight accordingly apply to the last period.

If fiscal authorities follows a *Ricardian policy* , the second period surplus in the Ricardian case must be, from (2.1),

$$s_2^R = M_1/p_2^R, \tag{3.1}$$

[10]This scenario is meant to capture in a quick (but not so dirty) way the long run stochastic equilibrium of an economy with fiscal policy regime switches.

with M_1 being, as before, the predetermined outstanding stock of nominal bonds in the second period, and p_2^R denoting the price level in the second period if a Ricardian policy is followed.

On the other hand, in a *non-Ricardian regime*, fiscal authorities pick an arbitrary second period primary surplus s_2^{NR}, in which case the price level is the second period is fiscally determined and equals

$$p_2^{NR} = M_1/s_2^{NR}. \tag{3.2}$$

I assume, to simplify, that consumers know in advance which arbitrary s_2^{NR} fiscal authorities will pick in the second period should they follow a non-Ricardian policy. What matters is that this s_2^{NR} is fixed in real, not nominal, terms.[11] What we still do not know, and must find out, is whether the condition $M_0 > 0$ is still needed to enable the government to pick s_2^{NR} independently of s_1.

3.2. **First period.** Intertemporal optimality requires that the arbitrage condition (1.1) be satisfied. As a result, equilibrium prices must satisfy

$$\phi \frac{p_1}{p_2^R} + (1-\phi)\frac{p_1}{p_2^{NR}} = 1 + r. \tag{3.3}$$

This is a stochastic difference equation in prices today and tomorrow but I now show that its solution is indeterminate as long as $\phi > 0$ and s_2^R is endogenous as specified in (3.1).

The proof parallels the one used to establish indeterminacy in the perfect foresight case. Pick *any* $p_1 > 0$. Given M_0 and s_1, the first-period government budget constraint (1.5) enables us to compute M_1. Once we know M_1, the valuation equation (3.2) gives us p_2^{NR}, the price level in a second period in a non-Ricardian regime. We can then solve the arbitrage equation (3.3) for p_2^R, the price level in the Ricardian regime. Finally, the second period government budget constraint in the Ricardian regime, (3.1), provides us with s_2^R, the (endogenous) second period surplus in the Ricardian regime.

Formally, the solution is parameterized by the indeterminate p_1. Given s_1 and s_2^{NR}, it can be written recursively as follows:[12]

$$\begin{aligned} M_1 &= M_0 - p_1 s_1, \\ p_2^{NR} &= M_1/s_2^{NR}, \\ 1/p_2^R &= (1+r)/(\phi p_1) - (1-\phi)/(\phi p_2^{NR}), \\ s_2^R &= M_1/p_2^R. \end{aligned}$$

[11] Letting, in addition, consumers form expectations on s_2^{NR} would uselessly complicate matter, and not be very convincing anyway since the fiscal theory of the price level has no theory of optimal public spending or taxation to present.

[12] Some equations that appear earlier are reproduced here for clarity.

Straightforward combination of these equations implies

$$\frac{M_0}{p_1} = s_1 + \frac{\phi s_2^R + (1-\phi) s_2^{NR}}{1+r}. \tag{3.4}$$

Contrary to what happens in the non-Ricardian perfect foresight case, this expression does not yield, regardless of the value of M_0, a determinate solution for the initial price level p_1 because s_2^R is endogenous. Instead, equation (3.4) holds given any M_0 and for any p_1, and it determines s_2^R as a function of these variables. Thus, in spite of the feasibility of non-Ricardian regimes in some states, an intertemporal budget constraint binds the actions of the government in Ricardian regimes, and the price level is indeterminate. The fiscal theory of the price level holds in some states, but it is not enough to provide a nominal anchor.

The only two ways to avoid indeterminacy would be to assume that $\phi = 0$, or that (contrary to what we have assumed) s_2^R is fixed. The former case is one in which agents place literally a *zero* probability on the future emergence of a Ricardian regime. The latter case unacceptably labels as Ricardian a regime which is really non-Ricardian.[13] We must thus conclude that any positive, however small, possibility of a switch to a Ricardian regime reestablishes price level indeterminacy.

Remarkably, this indeterminacy is perfectly consistent with the fiscal determination of the price level in states of nature in which policy is non-Ricardian. A careful examination of the valuation equation (3.2) reveals that the price level p_2^{NR} depends on fiscal policy through s_2^{NR}, but that the stock of outstanding nominal liabilities is itself indeterminate, as it depends on M_1 which depends in turn on the indeterminate p_1.[14]

Last, but not least, the operation of the non-Ricardian regime in the second period does not require anymore a *surprise* revaluation of nominal assets. Quite the contrary. Pick an arbitrary p_1, and imagine for instance that s_2^{NR} is very small. Consumers understand that, as a result of the fiscal theory, the price level $p_2^N R$ will be high in the non-Ricardian state (equation 12). But arbitrage then imposes that p_2^R be small (equation 12). Therefore, a high real rate of return on nominal bonds is required in the Ricardian state to compensate investors for the low real return in the non-Ricardian state.

I summarize the results of the paper into the following

[13] In both cases, we obtain the perfect foresight non-Ricardian equilibrium described in section 2, whose existence depends on the condition $M_0 > 0$.

[14] To ensure that non-Ricardian regimes are possible in the second period, I impose that p_1, s_1 and M_0 jointly satisfy $M_0 - p_1 s_1 > 0$, which guarantees that $M_1 > 0$.

Proposition. *Suppose there is a probability ϕ that future policy will be Ricardian, and a probability $1-\phi$ that it will be non-Ricardian. Let M_0 denote initial money balances. Assume the nominal interest rate is pegged.*

A. If $\phi > 0$, then 1) an equilibrium exists regardless of the value of the initial money stock M_0, 2) the price level is indeterminate, and 3) the price level in the non-Ricardian state is fiscally determined, yet indeterminate.

B. If $\phi = 0$, then 1) non-Ricardian regimes are feasible if and only if $M_0 > 0$, and 2) the price level is fiscally determined, and determinate.

C. If $\phi = 1$, then 1) Ricardian regimes are feasible regardless of the value of M_0, and 2) the price level is indeterminate.

We can place high confidence in parts A and C of this proposition, since neither requires $M_0 > 0$. Asset revaluation is not needed for parts A and C to obtain, as they follow through even if $M_0 = 0$. However, we should view part B with great suspicion, since it entirely rests, as noted earlier, on the dubious foundation of a surprise revaluation of assets in a perfect foresight model. Indeed, the requirement that M_0 be positive for part B of the proposition to obtain appears almost oxymoronic. Consumers pick $M_0 > 0$ voluntarily only if they are surprised, and do not realize that fiscal authorities will finance, say, a primary in period 1 by devaluing nominal assets in period 2. Founding the results in part B on an assumption so blatantly in contradiction with the starting point of perfect foresight ($\phi = 0$) is, too put it mildly, perilous. In other terms, what we have here is one of those rare cases in which looking at policy surprises in a perfect foresight world (instead of specifying that consumers face a distribution of future policies) gives us a misleading answer by letting us make a simplifying assumption that is not orthogonal to the issue under consideration. We are on solid ground, however, as soon as we specify that agents form rational expectations about the distribution of future policy regimes (part A). Fiscal policy is non-Ricardian in some states; yet the price level is indeterminate.

Cushing (1999, p. 147) had already warned us, in a setting quite different from this one, that non-Ricardian regimes do not provide a nominal anchor "[o]nce agents are allowed to expect (rationally) that debt will not converge under a non-Ricardian fiscal regime." The results of this paper tell us that his warning should be heeded more generally.

4. Conclusion

This paper does not invalidate the fiscal theory of the price level. Non-Ricardian fiscal regimes are possible, and in that respect Cochrane (1998, 2001) or Woodford (1997), to name but a few exponents of the fiscal theory

of the price level, are definitely innocent of the charge of logical inconsistency sometimes levied against them.[15] However, their argument that fiscal determination of the price level implies price level determinacy in spite of the peg of the nominal interest rate is in generically incorrect. The reason is that the stock of nominal assets is itself in general indeterminate.

Niepelt (2001) is right to point out that the fiscal theory does not survive the (reasonable) assumption that should be M_0 under perfect foresight of non-Ricardian regime. Yet his argument that this is the end of the fiscal theory of the price level as we know it is incorrect, for the very same reason Cochrane and Woodford are partially wrong. Provided $0 < \phi < 1$, non-Ricardian regimes are feasible; they are associated in some states of nature with a fiscal determination of the price level; yet the price level remains indeterminate under a nominal interest rate peg because the stock of outstanding nominal assets is indeterminate.

In short, this paper should be viewed as reconciling (hopefully) proponents and opponents of the fiscal theory of the price level.

As usual, much remains to be done. Policy regimes could be made endogenous, but this has more to do with the theory of optimal spending and taxation than with the fiscal theory of the price level per se. The model could be extended to richer environments: non-frictionless view of money, neoclassical production rather than manna, productivity shocks, tastes shocks, richer maturity of public debt, consumers averse to fluctuation of consumption over states and/or dates, many periods, overlapping generations etc. The results will undoubtedly change, but the basic message will remain the same: non-Ricardian regimes are possible, but the possibility of Ricardian regimes, however small it is, is enough to make the price level indeterminate.

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[15] See, for instance, Buiter (1999).

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