

Response to the Referee's comments.

Willem H. Buiter and Anne C. Sibert, 25 October 2015

Report on

“Government Deficits in Large Open Economies: The Problem of Too Little Public Debt”

by Willem Buiter and Anne Sibert, for the Economics-ejournal.

This paper provides a rigorous model of public sector debt (and deficit) accumulation in the presence of integrated financial markets across countries and increasingly costly tax collection. This is of value in itself because there is very little in the existing literature on these themes, and it would be welcome to have some formal analysis on this topic – to serve as a starting point for more detailed analysis of the key mechanisms involved, if for no other reason.

Second, in support of that point, there are number of useful insights into the debt accumulation process in an international context that we didn't have before: the role of costly (financially, or politically, or in compliance costs) tax changes, the redistributive real interest rate mechanism, the distinction between the single country process, the few countries case, and the large number of (social optimum) case.

Nevertheless, the model in this paper is pretty specific and contains a number of restrictions which need to be relaxed in order to explore the extent to which the results then change. This would enable us to identify the key mechanisms in debt accumulation. Some of this is done in the paper: extending the analysis to labour market effects (distortionary labour taxes), to capital accumulation and investment goods.

More important would be to go on to examine the extent to which having no monetary policy (no internal coordination problem), imposing sustainable fiscal rules (and hence no risk premia), a simplified model, or an incomplete time inconsistency explanation, distorts the results. I don't say this to run the paper down and imply that it should not be published; but that it should be seen as a platform to examine these possibly more crucial cases, and be presented as such.

Response: We agree with the referee that it would be very valuable to extend the approach of our paper by adding money to the asset menu and introducing a meaningful role for money, either by including financial frictions and a banking sector and/or through nominal wage and price rigidities. That, however would result in a much more complex and much longer paper (most likely a sequence of papers), and likely one where analytical results would have to make way for numerical analysis. The current length of the paper is just over 40 densely argued pages, which seems ample. We hope to pursue the extensions and generalisations suggested by the Referee in the future, but feel strongly that one of the strengths of this paper is its simplicity and clarity, which permit us to derive analytical results.

Risk premia would require a stochastic model – again a desirable extension, but also, in our view, best left to further research. As regards us focusing in most of the paper on the case where the government can credibly commit itself to a sequence of taxes (which means that in the single-country special case of our model the equilibrium

would be Pareto-efficient) rather than acting in a time-consistent manner (deriving the government's decision rule using backward induction through dynamic programming, this was a deliberate choice to allow us to focus on the efficiency losses caused by lack of international cooperation. We do consider the case of time consistent taxes for a three-period model and find this does not alter our main result that, with a positive stock of initial public debt outstanding and some market power, lack of international cooperation causes the initial level of taxes to be too high and the associated government deficits too small; the (constant) level of taxes in subsequent periods is too low. Time-consistent taxes are, however, strictly increasing over time, unlike in the case with commitment, when (with positive initial debt) the initial period's tax rate is lower than the constant tax rate set in all subsequent periods.

Relaxing the symmetry assumption is clearly a highly desirable extension, but would require a computational rather than an analytical approach.

More detailed comments:

1) The assumption that all debt must remain sustainable is an obvious restriction that rules out any risk premia because agents know that fiscal policies always remain sustainable. Risk premia have been a major component in the Euro debt problem, and the fiscal rules should be relaxed to allow at least a probability of default to reflect this reality. In other cases, an active monetary policy may be the important factor.

Response: Our deterministic model cannot handle default risk premia. A stochastic model with incomplete markets would be required to address default risk in a meaningful way. Sovereign default costs (private and social) would have to be modeled. This important extension will have to await future research.

2) The countries here are symmetric. Since we already know that the importance of coordination is strongly affected by country asymmetries, it is important to know if that is also true in this multi-country debt setting.

Response: As noted earlier, the country symmetry assumption is necessary to get clear analytical results. But the nature of the externality does not change with asymmetric countries, as long as each country has a positive stock of initial government debt. The externality works as follows: higher taxes in a country put upward pressure on the global real interest rate; with positive initial debt stocks this raises future taxes in every country; the additional real resource cost of extracting higher taxes (or the increased distortions caused by higher taxes) are not fully internalised by non-cooperating national governments, each of which only considers the utility of the domestic consumers.

3) Inefficiencies arise only in this multi-country debt setting. But might not the same be true if there are multiple actors/institutions within (say) a single country? This is not considered. But OLG models are, where we see intergenerational redistributions (casual observation suggests this may be larger than the inter-country redistributions featured in this paper?). So this paper is presumably the spatial version of the time series results.

Response: in an OLG model, where the government maximizes a suitable social welfare function that is strictly increasing in the lifetime utility of all households currently alive and yet to be born, any distortionary or costly-to-extract taxes on

domestic current and future generations would be properly internalised by an optimising government. So the inefficiencies studied in our multi-country model with nationalistic governments would not be present. We might get the kind of results suggested by the referee if the government in period t only cared about the wellbeing of generations alive at time t . In a single-country setting, this would create incentives for a ‘myopic’ government to rob future generations by setting taxes at a level lower than the level that would be chosen by a government that cares about future generations also.

4) The fiscal sustainability restriction shows that the high taxes deficits today and low taxes to-morrow result, which many countries seem to strive for, is not just an artefact of the election cycle. Nor is it natural time inconsistency (promises of sustainable deficits that get abandoned). In fact, the model here is of the form $x_t = f(x_{t+1}, \text{other stuff}_t)$ which means it satisfies the Markov property and should be solved by dynamic programming in reverse (optimisations going forward in time), but policy “implementation” (in a manner of speaking) going backward [as laid out in Bellman’s second book]. That means the implementation phase starts by imposing the terminal condition, and the broken promise that gives rise to possible time inconsistency is that the initial condition, b_{t-1} when determining the second period outcomes, is ignored.

Response: The time-consistent derived in the section ‘Time Consistent Taxes’, is indeed derived using Bellman principle of optimality – by backward induction. The proof in the Appendix of Proposition 6 makes that clear.

5) Putting the last point another way, b_{t+1} in (9) is a function of b_t and b_{t-1} . But this last term is not, as far as I can see, taken into account. In a multi-period problem, $n \geq 3$, the decision rules at $t = 2, 3, \dots$ become suboptimal, as we see in section 5, opening the door to time inconsistency. It would help to have a more exact explanation of how time inconsistency can arise. Note that, if you impose (10) this is time inconsistency about the route by which you get to the final outcome; not time inconsistency about the final outcomes which is the text book case we discuss. This is why a better explanation is important for this paper. normally

Response: in equation (9), b_{t+1} is a function only of b_t , not of b_t and b_{t-1} . It is true that, when optimising recursively, starting in the last period, taking the state variables (the initial debt stocks at home and abroad) as given, and optimizing utility for the last period ignores that fact that these state variables that are taken as given are in fact influenced by policy choices made in earlier periods. This makes the time-consistent policy suboptimal even when $N=1$. The optimal tax policy when the initial stock of debt (at the beginning of period 0) is positive is to set a period 0 tax rate that is lower than the constant tax rate for periods 1, 2, Clearly, if the government re-optimises in period 1 (and has a positive stock of debt outstanding at the beginning 1, it would again choose a tax rate for period 1 that is lower than the (constant) tax rate in periods 2, 3, So the optimal policy is not time consistent. The time-consistent sequence of taxes starts at a level below the optimal level and rises each period. The intuitive reason is that, taking the inherited debt stock as given the policy maker ignores the fact that lower taxes in earlier periods have raised his initial debt stock, forcing him to impose higher taxes today.

6) The intuition that $N=1$ (or $N \rightarrow \infty$) represents the social, global or cooperative

equilibrium, but $N > 1$ the intervening non-cooperative cases is good. But these results have been available for sometime; see de Bruyne (EER 1979) or the Hughes Hallett and Rees book (1983). Some acknowledgement of that should be included.

Response: $N=1$ represents the social optimum. $N > 1$ without cooperation is inefficient. The gap between the social optimum and the non-cooperative equilibrium is largest when countries have no market power ($N \rightarrow \infty$). ‘Competitive’, non-strategic behaviour by governments is therefore consistent with sub-optimal outcomes. References to de Bruyne (1979) and to Hughes Hallett and Rees (1983) have been included.

7) The paper’s title suggests there would be an optimal level of public debt, and the analysis gets very close to that issue. The paper itself never specifies what it thinks “too little” is or whether the model actually predicts that (the inter-temporal redistribution results do not, in themselves, suggest anything of that kind). This is an important loose end that needs to be cleared up. At least some reference to the existing literature on optimal debt levels driven by the marginal product of public capital (see Aschauer 2000, Aiyagari and McGrattan 1998, Checherita et al 2014).

Response: the optimal level of public debt, given the initial stock of public debt, is the level of public debt with commitment and cooperation. We point out that lack of cooperation will result in a level of public debt that is too low. The optimal debt sequence permits ‘tax non-smoothing’, raising consumption in the initial period by permitting lower taxes and thus a lower real interest rate. This result applies in an endowment economy and in an economy with endogenous labour supply but no real capital as well as in an economy with capital. The role of debt is therefore quite distinct from that considered by Aschauer (2000), Aiyagari and McGrattan (1998), Checherita et al (2014), who look at the role of public debt issuance when the government engages in the accumulation of productive public sector capital. We do, however, discuss all three alternative approaches in the introduction.