

## 1 Reply to Referee #1

I highly appreciated reading your paper entitled "The Possible Trinity: Optimal interest rate, exchange rate, and taxes on capital flows in a DSGE model for a Small Open Economy". The author builds a DSGE model to analyze the impact of capital controls on macroeconomic stability modeled as a tax on either foreign liability of households or a tax/subsidy scheme for flows of liabilities. He finds that, in general, the tax reduces the loss of institutions following their policy functions. The author puts a lot of effort in building a DSGE model capturing a complex setting of assets and describes the intuition behind those equations very well. He, furthermore, shows the reason why losses in the different scenarios differ.

First, I must give recognition to my referees for the difficult task of evaluating a paper that is a direct outgrowth of another. Although I have tried to make it as self-contained as possible through the use of the two Appendixes, it is possible that some readers may need to also read parts of the parent paper in order to have a more in-depth understanding of the model. This is especially so because practically all DSGE policy models use one policy rule: either a) one that reflects the targeting of the nominal interest rate through a feedback rule that responds to deviations of the inflation rate and possibly also GDP from certain reference values, or b) one where there is an exchange rate policy (say a fixed or pegged exchange rate). With such a simple policy rule frameworks, the models can avoid getting into the "nuts and bolts" of central banking that are key to the functioning of the complex feedback mechanism. For example, what the central bank actually implements in order to influence the interest rate is an organized intervention in the bond market (open market operations). But modeling this can be sidestepped because the simplicity of the policy makes the more complete model (that would include the bonds actually bought and sold) decomposable, so there is no harm in leaving these bonds out of the (core) model. However, if one wants to model an economy where the central bank uses both interest rate and exchange rate policies, a major difficulty is introduced and there is no way of avoiding the need to use a bigger model that includes the assets involved and their interconnections. This is what I have done in the parent paper (and in various other earlier and even bigger models that I decided to pare down for communicability). The present paper complicates things in a new direction, which is the use of a third policy rule that aims at influencing capital flows. If one has not internalized the earlier, in itself complicated model in relation to the usual SOE macro model, reading the present paper may not be easy. So I fully sympathize with the difficulties my referees may have faced. But if the model has complications it is because essential aspects of the reality of the interactions between policy actions and the macroeconomy are themselves complicated. There is no (formally correct) way of simultaneously facing the

fact that so many central banks have some form of exchange rate policy (even if it is presumably secondary to their interest rate policy) and avoiding the complications regarding the assets (and liabilities) involved. These assets are basically the domestic currency bonds bought and sold in order to influence the interest rate and the CB international reserves that increase or decrease every time the CB intervenes in the FX market. And these assets are linked through the CB balance sheet. The present model includes all of this and adds a systematic taxing policy on household foreign debt. The combination of these three systematic policies generates dynamics that are by no means simple, but it is the reality that is complex. I built what may seem a complex model because it is the only way (I have found) for modeling this complex everyday and quite universal reality.

**As this may be the most crucial part of the model, it might be the reason why the author discusses the impulse response functions very shortly. I would suggest to add some more explanations on the differences in IRFs in the different scenarios even if the paper is already pretty long.**

The section that reports an exercise showing that the addition of the tax/subsidy policy when one already has interest rate and exchange rate policies would be beneficial in reducing the variability of inflation and thus for CBs that value highly low inflation variability is only meant to be an illustration. Hundreds of these illustrations can be implemented using the Dynare model that I have contributed and that is quite simple to use if one has read the paper carefully. Since "the paper is already pretty long" and my other referee remarks that it is too long and should be streamlined I do not think that adding more such illustrations would be a good idea. This is especially so because, an IRF, even if it is a highly visual way of transmitting the effects of the change in policy is a long way from the substance of the results, that have to do with the effects of the policy actions in reducing a weighted average of variances that simultaneously take into account not only the dynamics of the deterministic part of the model but also, and very significantly, the stochastic properties of the exogenous autoregressive shocks. So focusing on one particular shock when there are actually 4 (of the 6) shocks with relatively high variances is a very piecemeal approach that can better be dealt with by means of the methods used in the main sections of the paper.

**Additionally, the author might think about including some insights into how the small economy assumption affects the results.**

The small open economy assumption is a good approximation for most countries in the world but obviously not for large economies or aggregates of countries that share certain basic policies (such as the euro zone). A model for a SOE need not model the rest of the world and hence possible policy reactions to the world effects of the SOE's policies. For large countries, I believe that it is even

more necessary to go down this difficult road because they also have some form of exchange rate policy in addition to their more visible and systematic interest rate policy, and possibly also have taxes related to foreign assets and liabilities. Notice that the historical debate over the Trilemma or Impossible Trinity has not been focused on SOEs only. But as far as I know, it has only been dealt with in verbal or econometric terms, not in modeling terms. I believe that I have shown that it is perfectly possible to deal with such issues in a DSGE model. But this requires the introduction of non-standard modeling aspects such as the inclusion of the broad set of the assets involved in the grinding out of the effects of (and constraints on) the policy actions of central banks and treasuries.

**Is the kind of tax imposed always beneficial in terms of a lower loss?**

I do not want to unduly make broad generalizations. So let me be very specific. The particular but relatively standard macro model for a SOE that I constructed, which is expanded to allow for 7 different "policy regimes" (given by the 7 faces of a policy triangle), in combination with the 4 alternative CB preferences I used (that reflect CBs that care A) only for inflation, B) only for output, C) for both with equal weights, and D) for inflation, output, and the RER with equal weights) shows that, both in the case of the (rather general) simple policy rules I used and the case of optimal policy under commitment (and full information, in a linear-quadratic optimal control framework for forward looking models under the assumption of rational expectations), the introduction of a tax on household foreign debt is always beneficial. In the optimal policy under commitment framework, there is one case in which a two-instrument policy is almost as beneficial as the full three-instrument policy: remarkably, for all 4 of the CB preferences used there is hardly any additional loss to forfeiting the interest rate as a policy instrument.