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Welfare implications when closing small open economy models

Hüseyin Murat Özbilgin *

Research and Monetary Policy Department, Central Bank of Turkey, Turkey

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ABSTRACT

This paper establishes that the closing method matters when the small open economy model is used for welfare analysis. The differences stem from the impact of the closing method on debt dynamics. When the ad-hoc parameters are set so that the current account volatility is controlled for across models, the welfare properties of versions with portfolio adjustment costs (PAC) and debt elastic interest rates (DEIR) are significantly different from the version with an endogenous discount factor (EDF). Nevertheless, this outcome is an artifact of an unrealistically dispersed distribution of the net foreign assets under PAC and DEIR, and can disappear under alternative calibrations of the ad-hoc parameters. In this sense, a seemingly innocuous application of PAC and DEIR versions may imply spurious results regarding welfare especially if a highly volatile economy is studied. Under commonly used functional forms, the spuriousness of welfare implications is found to be more radical under DEIR than PAC.

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1. Introduction

The small open economy real business cycle model has been the workhorse device in international economics. Numerous papers have utilized various versions and extensions of the model for the analysis of a wide range of questions dealing with business cycles as well as welfare. It is well known that the market incompleteness in the small open economy real business cycle model leads to the fact that the steady state value of the net foreign assets cannot be pinned down. Consistency of the steady state with any value of the net foreign assets brings about long-run effects when the economy is subject to transitory shocks, causing problematic dynamics and computational difficulties. In their

* Tel.: +90 312 507 5424.
E-mail address: murat.ozbilgin@tcmb.gov.tr.

influential paper, “Closing Small Open Economy Models”, [Schmitt-Grohé and Uribe \(2003\)](#) conclude that the alternative ways to deal with this problem, i.e., to “close” the model, lead to similar outcomes.

Nevertheless, Schmitt-Grohé and Uribe’s result is exclusively about the second-moment properties and does not imply that the closing method is immaterial for every other property pertaining to the model outcome.¹ This paper argues that the closing method is important when the small open economy model is used for welfare analysis. The argument rests on a fact that has been largely overlooked in previous literature. The fact is that, the application of a particular closing method literally means taking a stance on both the location and the scale of the ergodic distribution of the net foreign assets, although the model itself lacks a rigorous theoretical backing in the modeling of this crucial variable. Consequently, through natural linkages in the model such as the national income identity, the closing method becomes critically effective in shaping the distribution of other key variables such as consumption, especially their first moments. Therefore, the long-run welfare properties differ across models with different closing methods. Such differences are not negligible, and highly sensitive to alternative calibrations of the ad-hoc mechanisms in the portfolio adjustment cost and the debt-elastic interest rate versions of the model, suggesting spurious results. In these respects, practices such as selecting the closing method arbitrarily, and utilizing it without a well-founded, robust calibration exercise as well as a thorough sensitivity analysis can potentially be troublesome, in particular when the model is used for welfare analysis.

This paper formally examines the impact of the closing method on welfare by studying the cost of quantitative capital controls under the canonical version of the small open economy real business cycle model. In essence, the exercise I undertake is similar to what was done by [Mendoza \(1991a\)](#). I study the welfare cost of restricting the quantity of the international bonds traded in order to target a certain trade balance, but not only under the version of the model with an endogenous discount factor (EDF) as in [Mendoza \(1991a\)](#), but also under the versions with portfolio adjustment costs (PAC), and a debt-elastic interest rate (DEIR). The latter two versions were studied in [Schmitt-Grohé and Uribe \(2003\)](#) and are the two most commonly used closing techniques in the literature.² In my experiments, the capital controls under each version lead to the same model economy. By this virtue, the welfare levels can be compared with a common benchmark. Consequently, I am able to put in perspective the extent of the differences in the joint ergodic distribution of the variables under each version by characterizing what these differences really imply about welfare in terms of the standard Hicksian compensating variations.

My experiment is revealing as to how the welfare implications of the EDF, PAC, and DEIR versions of the small open economy model differ from each other. In terms of the ex-ante welfare cost in the terminology of [Mendoza \(1991a\)](#), that is, when the welfare is computed conditional on the distribution of the state variables in the no-capital-controls economy, there are significant differences in the implied welfare costs of capital controls across different versions, reflecting the discrepancies between the long-run implications of each. Under the EDF version, the ex-ante welfare cost of capital controls is obtained to be small, at around 0.02 percent in terms of Hicksian variations, in line with the level reported by [Mendoza \(1991a\)](#). Then, the experiment is repeated for PAC and DEIR versions. Given the simplicity of the model structure, the resulting welfare costs are sizable under the DEIR model, which implies a welfare cost of 0.34 percent.

Nevertheless, a careful inspection of the results reveals that the higher costs are mostly an artifact of the high volatility in net foreign assets, a variable whose moments are usually not reported. Indeed, for a given volatility in the current account, the net foreign assets in PAC and DEIR models will always be more volatile and more persistent than those under the EDF, because the former two versions work through punishing the response of net foreign assets to shocks. The higher volatility in net foreign assets then implies that, once the risk is taken into account under the solution method, the ergodic mean of this variable will be lower. The consequent lower interest payments are

¹ For instance, [Arellano and Mendoza \(2002\)](#) argue that the result would not hold in sudden-stop economies.

² [Schmitt-Grohé and Uribe \(2003\)](#) consider another version of the small open economy real business cycle model with incomplete markets that features an endogenous discount factor without internalization. This version is not included in this paper, because its welfare properties closely mimic those of the EDF version.

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