Fiscal Stabilization Policy in a Phillips Model with Unstructured Uncertainty

Satoru Kageyama[*]

Ken Urai[†]

Abstract

In his famous book, *Risk, Uncertainty and Profit*, F. Knight distinguishes the risk that can be treated under the probability consideration from the uncertainty. However, the second generation Chicago School merely abandoned the model including the situation with Knightian uncertainty and/or time lags while simply discarding the Keynesian policy arguments and views of the world. Therefore, the problem whether or not there exists an optimal stabilization policy based on a certain rule even for the case with Knightian, unstructured uncertainty still have an important meaning.

In 1954, A. W. Phillips shows that in his continuous-time differential-equation system of the multiplier-accelerator model including the government spending, a stabilization policy could be modeled as a servomechanism for an error-correction, feed-back control problem. This model is constructed so that it can treat the external lag or the disturbance to the system, so the model is appropriate to formalize the incompleteness of the policy maker that M. Friedman had supposed. Furthermore, the policy rule depends merely on the GDP gap, so the effect of the internal lag is able to be suppressed to a minimal level.

The model, therefore, is appropriate to characterize the fiscal policy rules under Knightian uncertainty. In the Lucas critique, uncertainty of parameters based on the changes in the structure of economic model caused by the change in policy was pointed out. For policy design, however, the unstructured uncertainty including the errors for modeling itself is important. The purpose of this study is to show the existence of optimal fiscal stabilization policy based on the minimax principle even when policy makers are not completely rational, or in other words, the model has a perturbation.

In this study, we intruduce an additive perturbation into the Phillips model as an unstructured uncertainty for the model. The unstructured uncertainty is represented as a perturbation of the transfer function. This extension of the Phillips model is characterized as an H_∞ control problem. An existence of the optimal policy is shown under a minimization problem for operators in the Hardy space with the sup-norm, H_∞. Therefore, we have a conclusion that there always exists an optimal stabilization fiscal policy even when the time lags and the uncertainty based on the lack of rationality of policy maker, as pointed out by M. Friedman, would prevent policy-rule designer from having a proper expectation, and may seem to let us take highly conservative decisions.

[*]Graduate School of Economics, Osaka University, E-mail: qge803ks@student.econ.osaka-u.ac.jp

[†]Graduate School of Economics, Osaka University, E-mail: urai@econ.osaka-u.ac.jp