Simultaneous estimation of effective production funds and production functions: on the pattern of productions of energy, gas, and water

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Effective production funds(EPFs) of a region, country, and sectors of economy are a part of balance (inventory)funds participating in creation of goods and services. In the production functions (PFs) representing complex production objects, the effective funds, but not balance ones, have to be used. A method for the construction of standard PFs, which have EPFs as one of factors, was suggested in [2], for the case when production statistics contains investment data instead of or together with capital ones. The estimation of PF's parameters uses the capital dynamic equation defined by investments as well as a depreciation rate and a lag of investment capitalization. The latter values and the initial value of EPFs should be estimated simultaneously with a PF's parameters.

The problem of simultaneous estimation of the PF's and the dynamics parameters is an ill-conditioned one. It should be regularized with appropriate usage of additional expert information and non-trivial optimization technique. In [2] the calculation problems were overcome by the subsequent complication of classes of the PFs under estimation starting from the simplest Cobb and Douglass one. Also in the paper a special variant of the continuation method [3] was suggested which can overcome complexity of nonlinear minimization.

The work [1] develops the approach of [2] in the next respects. A coefficient of the realizability of investments is introduced in the dynamics equation. This coefficient represents a ratio of really used capital investments which is less of one because of corruption. As an additional means for overcoming of computational complexities, the transform to the index form of PFs was used. The latters are the production functions of the same specification which variables are the ratios of the current values of the original variables with respect to their initial values.

In this paper a new regularization condition on the initial and final values of the EPFs is being introduced. Results of realization of the proposedestimation model and techniques to real data for the sector of productions of energy, gas, and water of Russian economy will be presented.

References

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