

## Theoretical and Empirical Basis for the Integration of the Leontief and Sraffa Systems

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*This paper shows that the price system corresponding to Leontief's dynamic open model possesses all the properties of the regular Sraffa system. Both systems can accommodate fixed capital and problems associated with its joint utilization, transferability between industries and changing efficiencies over its lifetime can be overcome. Some empirical observations on the general relation between the rate of profit earned on invested capital, the on-cost profit markup rate and the rate of capital turnover have been presented. These form the basis for a new formulation of the dynamic price and output systems that facilitate their empirical application. The new formulation automatically incorporates imperfectly competitive industries.*

### I Introductory

About a decade prior to Sraffa's (1960) *Production of Commodities*, Georgescu-Roegen (1951) published a paper formulating the price system for the Leontief closed dynamic model. Its properties have been extensively studied by Morishima (1958), Dorfman, Samuelson and Solow (1958), Solow (1959), Zaghini (1971) and Szyld (1985), among others. Due perhaps to the disparate original motivations underlying the formulations of the Sraffa system and the Leontief dynamic price system (rehabilitation of classical methods and critique of neoclassical methods in the former and the study of periodic fluctuations in a multi sector context in the latter), it has not been realized that the two systems are, in fact, identical in all respects except one, viz., the relationship between the on-cost markup rate and the rate of profit earned on invested capital. To show this is the first objective of this paper. The second objective is to show that the system can be generalized to include fixed capital and can be empirically implemented to give results that are more realistic than those obtained from the static open Leontief price system.

The plan of the paper is as follows. After the introductory remarks in Section I, Section II shows that the Leontief dynamic open price system for the steady state has all the properties of the regular Sraffa system such as the impossibility of measuring capital independently of the income distribution, the

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