A SUPPLY-SIDE INTERREGIONAL MODEL OF
THE U.S. MANUFACTURING INDUSTRY: 1960–78

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ABSTRACT This paper presents a multiregional simultaneous model of the U.S. manufacturing industry based on the supply-side paradigm, focusing on the behavior of the primary inputs, capital stock and labor force, across the nine Census Regions. The estimated structure shows that the regional investment sensitively responds to the marginal productivity of capital in the respective region relative to the national average, while the net interregional migration basically follows the relative regional wages. As an application, the model is used for evaluating the economic value of migration and analyzing the relationship between the overall national growth and interregional equalization of income.

1. INTRODUCTION

In this paper we describe the mechanism of the behavior of the basic variables of the nine census regions defined by the U.S. Bureau of the Census. Unlike other regional models this model explains basic interregional economic phenomena from a supply-side viewpoint: fundamental economic growth is determined by the behavior of the primary production factors that are mobile across the borders of economic regions, and these movements in turn depend on relative marginal productivities.

Since we are interested in investigating how far this hypothesis can explain interregional economic relationships, we do not necessarily pursue goodness of fit of the model. If we were to improve fit, there would be at least two easy ways: different and individualistic specification for each regional equation or utilization of a good many regional dummy variables. The former was adopted by Baird (1983) for modeling subregions of Ohio. Models of the latter type are measurement without theory, useful only for short-term prediction. Instead of adopting these methods, we place two basic technical restrictions: specifications that are common to the nine regions and minimal usage of the regional dummy variables.

The characteristics of this model may be summarized as follows. First, we assume the autonomy of the regional economic system. This implies that, unlike the multiregion system developed by Milne, Glickman, and Adams (1980), which adopts a “top-down” approach, regionally defined variables are determined interdependently across the regional borders as well as within a region. The

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national economy is determined as aggregates of these variables, i.e., the model is "bottom-up" in nature. Thus, this model is not only a simple multiregional system, but also an interregional simultaneous system in that all the regional variables are simultaneously determined. National economic policies directly affect regional endogenous variables such as regional real investment accordingly to the situation of the regional economies – reflected, for example, in the regional wage rate relative to the national average.

Second, this model tries to test the validity of the supply-side paradigm in regional economies. For this reason, we avoid region-specific factors as much as possible and make the specification of the equations fairly simple so that the universality of the basic mechanism can better be tested. To be more concrete, we place the restriction that the specification of the model be common to all the regions, and focus our attention on the production factors, labor force, and capital. Naturally, the object of the study is not short-run fluctuations, but long-term behaviors of basic variables. This type of model was first developed by Fukuchi and Takenaka (1966) and then by Fukuchi and Nobukuni (1968, 1973) for Japanese regional economies, though there is a difference between those models and this one in that in the former, demand side short-term fluctuations were also studied. It should be noted that the performance of this model is far better than Baird's (1983) where different specifications were allowed for different regions.

2. MODEL

In this section we will explain the core equations of the model. Although this prototype model is small enough for us to grasp its fundamental structure and characteristics, a brief explanation will be helpful for easier understanding.

Production Function

\[
\ln VA_r = -56.28 + 0.1551 \ln K_{r,t-1} + 0.8288 \ln E_1 \\
+ 0.02985 T - 0.1502 D1 \\
R^2 = 0.9885.
\]

The production function is a Cobb-Douglas type with neutral technological innovation. During the observation period of 1960 through 1978 the manufacturing sector of the regional economy experienced a great deal of change in the share of the subsectors, or in the product-mix. There are several methods to cope with this problem. Since our purpose here is an investigation of how far the supply-side hypothesis can explain the behaviors of basic variables of the regional economy, we tried to keep the model as simple as possible. The only measure we applied was introduction of the regional dummy variable for Region 1 (New England).

The introduction of region-specific variables in the regional production function is not consistent with the ultimate market equilibrium because differences in the total productivity of the factors of production will eventually cause decline in the regions with lower productivity. This prohibits our interpretation of the structure of the model as a description of the regional economies approaching an equilibrium, though the mechanism we assume is not short-run. This basic viewpoint is maintained in the equations related to production factors.

According to the estimates we obtained in (1), the rate of technological