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The Existence Theorem and the Price Adjustment Functions

Masao Fukuoka
by
Yasuo Usami

This paper may be regarded as a revised version of "A Consideration of the Problems of the Existence of a Competitive Equilibrium" written by one of the authors in 1959. It attempts to clarify some points in the proof of the existence of a competitive equilibrium.

Let $z=(z_1, z_2, \dots, z_n)$ be the excess demand for n commodities, $p=(p_1, p_2, \dots, p_n)$ their prices, and $E(p)=[E_1(p), E_2(p), \dots, E_n(p)]$ the excess demand functions. Also let Z be a compact set of z , and P the price simplex defined by $\{p|p_i \geq 0, \sum_i p_i = 1\}$. We assume that $E(p)$ is an upper-semicontinuous correspondence from P to Z such that for every p in P , the set $E(p)$ is nonempty, convex, and satisfies $p \cdot E(p) = 0$ (Walras Law).

We consider the price adjustment functions $Q(p; z)$, which are defined by

$$(1) \quad p_i' = \frac{p_i + \max(kz_i, 0)}{\sum_j [p_j + \max(kz_j, 0)]} \quad (i=1, 2, \dots, n)$$

and

$$(2) \quad p_i' = \frac{\max(p_i + kz_i, 0)}{\sum_j [\max(p_j + kz_j, 0)]} \quad (i=1, 2, \dots, n)$$

respectively. Further if we consider the following two types of correspondence; (α) $\varphi(p, z) = Q(p, z) \times E(p)$ from $P \times Z$ to $P \times Z$, and (β) $\phi(p) = Q(p, E(p))$ from P to P , we obtain the following four approaches to the existence problem, i.e.,

- (a) (1) and $\varphi(p, z)$
- (b) (2) and $\varphi(p, z)$
- (c) (1) and $\phi(p)$
- (d) (2) and $\phi(p)$

Nikaido succeeded in proving the existence theorem by using route (a), and there is nothing to be added to his analysis. On the other hand, Kuhn and Uzawa attacked the problem by route (c) and (d) respectively, and it is here that some difficulty arises. The first aim of this paper is to show that Kuhn's reasoning in proving the contractibility of the image of φ by $Q(p, E(p))$ is not well founded, and consequently Uzawa's proof relying on a similar reasoning is also invalid. This is demonstrated by way of giving some counter-examples.

Our second aim is to give an existence proof following the remaining route (b). It should be noted that in (b) the function (2) might not be defined because its denominator might be zero. This is due to the fact that in this case the satisfaction of the Walras Law is not warranted. We shall show that a simple device will overcome this difficulty, and make the proof complete.

Finally we note that by inserting the equilibrium price p^* of (a) or (b) into $E(p)$, we warrant the existence of an equilibrium also in case (c) or (d), without relying on the contractibility of the image by $Q(p, E(p))$.

British Trade Unions and Industrial Relations, the Socialist Movement and Labour Party in the Stage of the Monopoly Capitalism —Britain in the Period of 1890-1914 (I)

by Kanae Iida

Twenty years from 1883 to 1914 during which the Labour Representation Committee as the herald of the British Labour Party was established and the labour movement and the socialist movement made a remarkable progress by leaps and bounds on a large scale not ever seen, were the period that the interesting relations were formed between the working-class parties and the trade union movement. In this essay the writer tries to pursue what connected the trade union movement and socialist movement with the working political party movement in order to study Japanese labour movement from 1920 to 1930 comparatively.

These days of eighteen-eighties which culminated in the 'Revival of Socialism' were following the appearance of 'New Unionism' were the starting point towards the 'Great Unrest' and the outbreak of the First World War, at the background of the collapse of the Second International. It was the advent of balance of power which necessitated the severe contradictions between monopoly capitalists connected with the state authority and the labour movement, confronting with the inward problems about the relations of trade unions and industrial relations, the socialist movement and working-class movement. In this case, following items must be stressed and be made clear. That is, (1) the rival relations for hegemony between union groups, (2) the ideological influence of the political parties and socialist organizations over the trade unions and their attitude towards the ideological propaganda, (3) the relations between the labour party and the Trades Union Congress, (4) many various ideologies involving the formation of the British Labour Party. (5) the position of the British Labour movement in the international labour movement. Under these views of point, the writer tries to study the labour movement from 1890 to 1914. It contains the following problems.

- 1) Introduction—An approach towards the Establishment of British Labour Party.

- 2) The Organization of the Docker's Union.
- 3) The New Unionism and Old Unionism in the Doch Strike of 1889.
- 4) Gas-workers' Union and the General unions.

(continued)

Geographical Application of the Principal Component Analysis

by Junjiro Takahashi

In recent years increasing attention has been paid by geographers to the so-called principal component analysis. As most geographic problems involve many interrelated variables, it is not surprising that multivariate statistical procedures are being favored in geographical analysis. General framework of the principal component analysis was developed originally by Hotelling and its significance in the decline of geography has been mentioned by Berry and others.

Main purpose of this paper is to demonstrate how to apply the analysis for regionalization, which is one of the most important data processing in geography.

Section 1. discusses general framework of data processing for regionalization and explains the basic data for which the principal component analysis was applied. The data matrix has 46 observations (prefectures in Japan) and 45 economic variables.

Section 2. deals with the interpretations of the results of the analysis. This interpretation was done mainly with reference to the loadings and is aided by a mapping of the component scores. Principal components identified are as follows:

- I Urbanization
- II Secondary—Tertiary activities
- III Size and Shape of the area
- IV Primary activities
- V Growth rate (income)

Percent of total variance explained by those five components reaches at 80.10%.

Section 3. deals with identification of the regions which are uniform with respect to urbanization. Linkage analysis was applied and the sets of regions in eight levels are identified.

Rural Labour Market in Shizuoka Prefecture 1885-1920

by Osamu Saito

Many economic historians studying Tokugawa agrarian history have been interested in the problem whether, or which of, various forms of employment can be regarded as the wage labourer in the 'modern' sense or its prototype; on the other hand, researchers other than historians have investigated the problem of, mainly, industrial labourers after 1920; between these two tendencies, however, the historical research of labour market in the mid- and later Meiji era seems to have been rather rare. This article is an attempt to fill this gap, to find out some relations among 'relative wages' (the index numbers of money wages/the index price for rice), *kiryu*-population as an index of a type of labour mobility, the landed system, the agricultural production, especially commercial cropping such as tea and citrus fruits in the case of Shizuoka Prefecture, and the rural industries such as *Enshu* cotton industry.

My emphasis is particularly on the relationship between the labour migration like *dekasegi* and a kind of commercialized activity consisting of both the rural industries and commercial cropping in dry fields. Taking two periods, 1898-1908 and 1908-18, and the increase rate of *kiryu*-population during these periods in each *gun* (subdivision of the prefecture), we can see that it correlated with the rate of the expansion of *Enshu* cotton industry and commercial cropping other than rice production, and with the checked tendency of differentiation of owner farmers. This proposition implies that the labour mobility seen in rural areas came about in the form, not of the migration but of purely functional one through by-occupations; therefore it is rural industries to which we have to pay more attention in the course of Meiji industrialization. It also implies that commercial farming in the dry fields might have the same function as rural industries had. If so, the viewpoint based on dichotomy, i.e. 'modern' manufacturing sector with imported industrial techniques and uncommercialized agricultural sector under the so-called 'parasitic landlord system', would have to be rejected with respect to Meiji industrialization. At the same time, we must not forget the other aspect of rural labour market: the fact that the extent of the market for farm labourers, not only in rice production but also in commercialized tea cropping, was reducing since the later 1890s, due to the substitution of employees by the familylabour. Finally, since these interrelated factors mentioned above have the direct relationship with the home market for industrial goods, we may conjecture that the home demand became contracted after 1920 as small rural industries had to compete with capitalist enterprises and as the growth rate of agricultural productivity became reduced.