

Review of Klein's Monograph No. 11<sup>1/</sup>

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This important work constitutes an innovation and, in many respects, an improvement over the studies on business cycles undertaken before the war by the League of Nations. Since that time, the statistical materials as well as the methods of testing have been developed, and it has proved possible to extend the period under study to twenty-one years.

Mr. Klein presents three models to the reader. The first consists of three behavior (response) equations and of three defining equations. The second model is made out of one demand equation only and of two defining equations. On the other hand, the third model is composed of a great number of equations, sixteen in all, among them four of definition. It appears to us especially interesting to compare the system used in the League of Nations report with Mr. Klein's third model.

As for the main themes, they run on about the same lines, the most important part being played by the equations for the demand of a) consumption goods and b) investment goods. As in the League of Nations report, Mr. Klein takes incomes as explaining variables, although in a slightly different form. The League of Nations study draws a distinction between workers' incomes, non-agricultural entrepreneurs' incomes, agricultural incomes and speculative incomes. Mr. Klein simplifies in this respect by limiting himself to a distinction between disposable income as the determining variable for the demand of consumption goods, and profits as the determining variable for that of investment goods.

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1. Economic Fluctuations in the United States, 1921-1941. Cowles Commission for Research in Economics, Monograph No. 11, John Wiley, New York, Chapman and Hall, London, 1950. 174 pp.

Cowles Commission Discussion Paper Economics 2025 is a translation of an article which appeared in Revue de l'Institut International de Statistique, Volume 18, No. 3/4, 1950. pp. 261-262.

The phenomenon of speculation in the stock exchange market which played quite an important role in the League of Nations study has been estimated to be less important by Mr. Klein. He does not give any reason for his choice nor does he criticize the choice made in the original study. A considerable improvement has been introduced by including, in the equation for the demand of investment goods, the stock of accumulated capital.

There is similarity on still another point. In the real estate sector, housing units have been treated separately. On the other hand, great differences are found in the treatment of price determination. Mr. Klein did not deem it possible to consider separately the prices of investment goods and those of the raw materials of agrarian origin. However, he took into account, in a very ingenuous way, the influence which involuntarily formed stocks have on entrepreneurs' decisions as to the volume of production.

From the point of view of statistical methodology, his work shows the influence of the developments which have taken place since 1944. The test of model I has been made with the help of three different methods, which are a) the maximum-likelihood method, b) the reduced-form method and c) the least-squares method. As is known, the two first methods differ from the least-squares method in that the whole system is considered simultaneously. In method b) one first reduces the system of economic equations by solving them with respect to the moment variables "t" and afterwards proceeds to the statistical test with the help of the traditional method.

Here are some comparable results for the first model. The following table gives the coefficients of the three equations; to the left of the table is the variable to be explained and at the top are the explaining

variables. Here is the key to the notation. C = volume of consumption; I = volume of investments;  $W_1$  = total of the salaries paid in industry (in constant dollars);  $W_2$  = total of salaries paid by the government (in constant dollars); T = taxes, etc...;  $\overline{\pi}$  = profits (in constant dollars); Y = national output; K = invested capital.

	$\overline{\pi}$	$\overline{\pi}_{-1}$	$W_1+W_2$	$K_{-1}$	$Y+T-W_2$	$(Y+T-W_2)_{-1}$
C = (a)	0.02	0.23	0.80			
(b)	-0.22	0.40	0.82			
(c)	0.25	--	0.80			
I = (a)	0.23	0.55		-0.15		
(b)	0.08	0.68		-0.17		
(c)	0.48	0.33		-0.11		
W = (a)					0.42	0.16
(b)					0.43	0.15
(c)					0.44	0.15

As evidenced by the table there are only slight differences between the results of the three methods. It is also shown that the propensity to consume of the workers is between 0.80 and 0.82 and between 0.18 and 0.25 for the non-workers. Moreover, it can be seen that the propensity to spend (the sum of the propensities to consume and to invest) is very close to unity for the non-workers. This means that there is only a slight tendency if any to hoard or dishoard a systematic part of the revenues.

In general, one can say that the new methods for testing are superior to the old ones; however, in some particular cases, the results of the antiquated least-squares method might be better. This seems to be true, for example, if one can test a given equation (1) when the system considered contains another equation (2), one explaining variable of which is more or less known. If, in this case, one chooses for this variable,

more or less known, a series which is highly correlated with the residual of equation (1), it may happen that the results found for (1), with the help of the new method, would be erroneous.

With respect to the presentation of Mr. Klein's book, the documentation of the statistical series is admirable. A great advantage is to be drawn from the presentation in graphical form of the equations tested in model III. The text is very compact and will be hard to grasp by non-econometricians.

The number of conclusions drawn by the author from his estimates is rather restricted and the impression is given that it would have been possible to draw many more. In that respect the work appears unfinished. As an excuse, the author points out that very often statistical materials are not abundant enough to permit the computations that science would ask for. To illustrate, he enumerates in chapter 4 the statistical series which should be collected in order to complete our knowledge of the cycle mechanism.

Netherless the author presents us with certain very interesting conclusions such as, for example, the following ones. He cannot find anything pointing to the influence of the rate of interest on active cash balances; nor can he find any influence of the national income on inactive cash balances. The inclusion, in the investment equation, of the capital already invested has great consequences for the size of the Keynesian multiplier; this has been estimated to be around 2 by the author. We have already mentioned, when we discussed the table, numerical results found for certain important coefficients.

If the author gives only a few conclusions because of the statistical uncertainty of the results, this serves only to illustrate the embryonic state of economic theory; and, a great many conclusions, given by less cautious writers seem here to be quite premature.

If, as was said by Mr. Koopmans, on good grounds, the method used by the Cowles Commission represents, in the main, the only scientific method, it is worth the trouble to ask oneself to what extent this method has been accepted in economics. Unfortunately, one can only conclude that this acceptance has been a very partial one. We consider it very useful, for example, in all economic discussions, to separate rigorously the different relations or equations which constitute a system. The number of publications where this separation is clearly made is, however, very limited and confusion between the different relations very often ensues. Another advantage of our method seems to be found in a clear distinction between the discussion of individual structural equations and the discussion of the results obtained by combining those relations. Once again, it has to be said that, although increasing, the number of examples of this method is nevertheless not very great as yet. Let us end our review by expressing the hope that Mr. Klein's work may contribute to the diffusion of this exact method of discussion among economists.